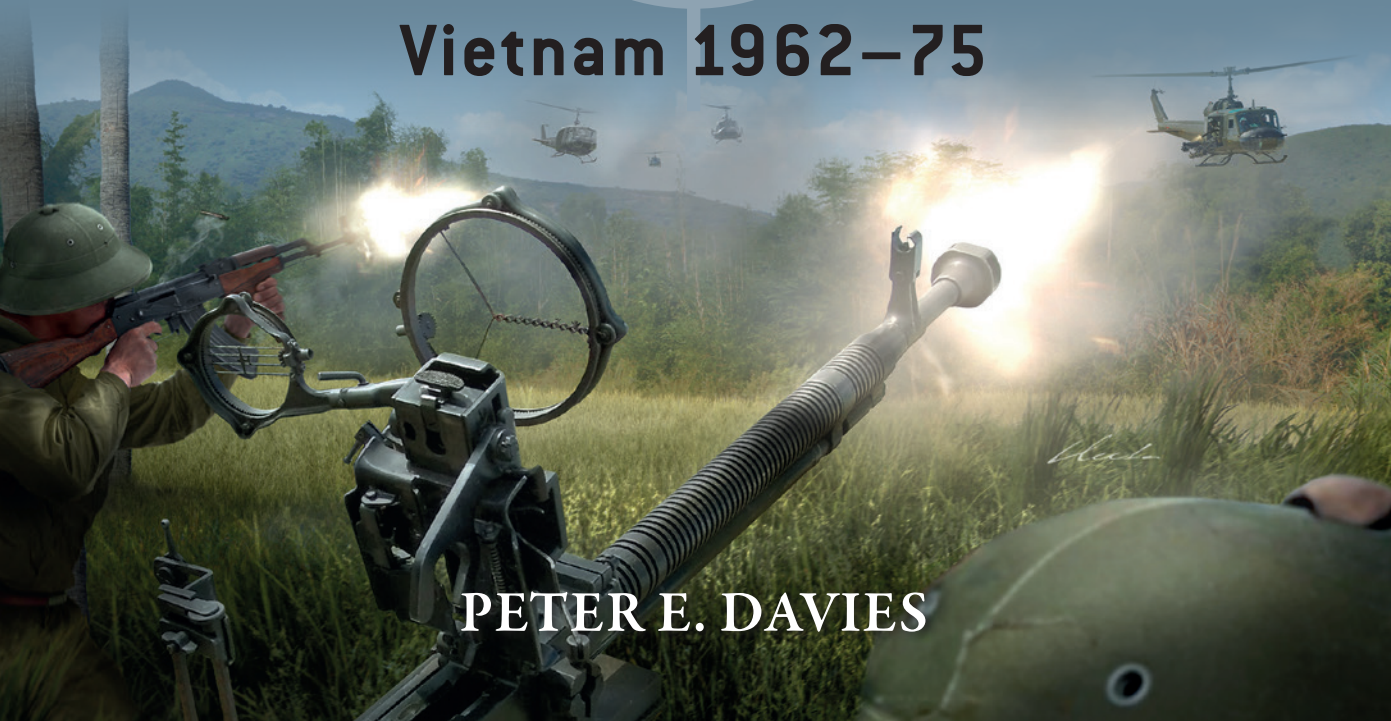
UH-1 HUEY GUNSHIP VS NVA/VC FORCES

Vietnam 1962–75



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CONTENTS

Introduction	4
Chronology	8
Design and Development	11
Technical Specifications	16
The Strategic Situation	31
The Combatants	39
Combat	52
Statistics and Analysis	73
Aftermath	77
Further Reading	79
Index	80

INTRODUCTION

Military use of the helicopter began in 1945 when the 1st Air Commando's frail Sikorsky R-4s performed medical evacuation (medevac) recovery of casualties in the Far East. From 1946, the Bell Model 47 entered service. With its large "soap bubble" cockpit cover and open tubework tail boom, it became the predominant light utility helicopter for 11 countries. As the H-13 Sioux (beginning a series of native Indian-influenced helicopter names) it entered US Army service in 1947 and saw extensive action during the Korean War, rescuing almost 1,000 downed airmen among a wide range of medevac and light transport duties.

Lt (later Gen) Victor "Brute" Krulak organized the first US Marine Corps helicopter assault using three-seat Sikorsky helicopters in May 1948. In Korea, the US Marine Corps' larger Sikorsky HRS-1 helicopters introduced the airmobility concept by airlifting a whole battalion of troops into battle for Operation *Bumble Bee*. The US Army adopted many of Krulak's procedures, beginning similar rotary wing operations shortly thereafter. Its first troop transport helicopter, the Sikorsky H-19 Chickasaw, appeared in 1951, and there were several attempts made to arm helicopters.

Proponents of airmobility, including Lt Gen James M. Gavin, wanted it to provide "vertical envelopment" – a World War II strategy using paratroopers to cut off and surround the enemy, rather than more difficult encirclement on the ground. In 1952, US Army planners requested 12 helicopter battalions to give them the independence to emplace and quickly recover troops in battlefield situations, reinforce them as required and protect them with armed "gunship" helicopters.

From 1956, the term "Sky Cavalry" entered the vocabulary at the US Army's Infantry School at Fort Benning, Georgia. It described an armored reconnaissance platoon with armed H-13 helicopters, drawing on the tradition of elite horse-riding

The first of three XH-40 protoype machines, 55-4459 was fitted with a 700shp XT53-L-1 engine that gave it a top speed of 138mph and the ability to reach an altitude of 17,500ft thanks to the helicopter's maximum weight being only 5,650lb – far less than service Hueys. The six pre-production YH-40s that followed dispensed with the domed fairing around the rotor column and had the horizontal elevators (seen here with end plates, which were later abandoned) moved forward. (US Army Aviation Museum)

troops with the advantage of speed and freedom of mobility. Throughout the Vietnam war, "Air Cav" troops would be ordered to "saddle up" for their combat flights.

During the first Indo-China War, the French had a few Hiller 360 and Sikorsky S-51 and S-55 helicopters for medical evacuation. Their policy of maintaining isolated outposts that took too long to relieve by road led to many being overrun by Viet Minh forces. This experience facilitated the case for US Army airmobility, overcoming some of the initial resistance of ground commanders. Further pioneering tactics for troop insertion, medevac and extraction in jungle terrain were developed by British forces in Malaya during the 1950s. The Borneo campaign against Indonesian insurgents in the mid-1960s refined RAF techniques for inserting Special Forces in small jungle landing zones.

By 1954 the use of troop-carrying helicopters for airborne assault was established, and it was essential to the Anglo-French Operation *Musketeer* to free the Suez Canal in 1956. French forces employed similar tactics during the Algerian campaign from 1954, using several S-58s (H-34) and H-21 helicopters with detachable 20mm cannon, machine guns, and rocket pods to suppress ground fire around landing zones. From 1958 turbine-powered Sud-Est Alouettes became versatile gunships with rockets, machine guns, and SS-11 wire-guided anti-tank missiles.

All these innovations, including the SS-11, were incorporated in America's airborne operations in Southeast Asia. The US Army had experimented with its first Sky Cavalry unit, the 7292nd Aerial Combat Reconnaissance (ACR) Company at Fort Rucker, Alabama, in March 1958 under Col Jay Vanderpool. He worked with the Army Aviation Center's Combat Development Office for several years to develop an armed helicopter strike force. In Exercise *Sage Brush* in 1955, the embryonic units tested several fixed and flexible armament options for helicopters. In October 1958, its first gunship was flown, an H-13D Sioux with 12 2.75in. rockets and two 0.50-cal. machine guns – too great a load for the small helicopter. Many variations followed, using H-34 helicopters with 0.50-cal. machine guns and 4.5in. field artillery rockets as interim gunships, pending delivery of the Bell HU-1 Iroquois.

The helicopter war quickly became a battle between North Vietnamese ingenuity and US Army tactics and equipment. VC troops, hiding in foxholes and tunnels, opposed helicopter landings and then often vanished into safe cover. This fighter has a Chinese Type 56 version of the Soviet SKS 7.62mm rifle – the standard Chinese army infantry weapon for 30 years. (NARA)

The first US helicopters to test airmobility in Southeast Asia were H-21C Shawnees – nicknamed "flying bananas" because of their shape – of the 8th, 57th, and 93rd Transportation Companies that arrived in Saigon in November 1961. Based at Qui Nhon, the units trained Army of the Republic of Vietnam (ARVN) troops in airborne assault tactics from January 2, 1962. Shawnees also supported outposts from which patrols were mounted to confront Viet Cong (VC) insurgents. They had only light, sideways-firing machine guns. However, the US Army sought a better helicopter, and by 1960 it had decided that the Bell XH-40 (basis of the HU-1 Iroquois) would be an ideal multi-role utility helicopter.

Robert S. McNamara, the cost-cutting US Secretary of Defense, established the US Army Tactical Mobility Requirement Board, led by Lt Gen Hamilton Howze, in 1962 to explore the application of new transport options for land operations. He felt that the US Army was slow to adopt the possibilities for new helicopter roles offered by the more powerful, turbine-powered HU-1. Howze's Board, persuaded by the demonstrations of gunship H-34s at Fort Bragg, North Carolina, in July 1962, established the principles of airborne assault by transport and gunship helicopter formations. Each US Army division's armored cavalry squadron would have an air cavalry troop.

Howze's recommendation was accepted by SecDef McNamara, despite strenuous objections from Strategic Air Command boss Gen Curtis LeMay, who wanted control of everything that flew, and knew the USAF controlled funding for US Army aircraft. The US Army had officially lost its aviation capability with the formation of the USAF in 1947, but versatile helicopters gave it a new purpose as an "airborne land force." Gen Maxwell Taylor, Chairman of the Joint Chiefs of Staff, saw this as a way for the US Army to adapt for the "brushfire wars" that characterized US foreign policy in the early 1960s, rather than being equipped only for all-out global conflict.

The 11th Air Assault Division (Test), formed at Fort Benning under Brig Gen Harry Kinnard, experimented with helicopters for reconnaissance, ground attack, and logistic support. For heavy transportation, the Boeing Vertol CH-47 Chinook was favoured to replace the H-37. Wargames in South Carolina pitted the 11th Air Assault Division against the premier 82nd Airborne Division in 1964, and the results clearly favored helicopter-borne tactics. The versatile Iroquois was perfectly suited to these tasks, although with each UH-1 (the change from the "HU-1" designation had occurred on September 18, 1962) costing $815,000, McNamara also wanted the concept to be proven in tests and initial combat exposure. On July 3, 1965, the 11th Air Assault Division, re-designated the 1st Cavalry Division (Airmobile), was alerted for overseas duty in Vietnam.

The earliest HU-1s to arrive in Vietnam belonged to the US Marine Corps' 57th Medical Detachment (Helicopter Ambulance), which sent five HU-1As for medevac duties to Nha Trang and Qui Nhon from May 2, 1962. By 1972 more than 500,000

casualties had been rescued in these hazardous "Dust-Off" missions. Two more US Army helicopter companies arrived in September 1962 with H-21s, still armed only with light infantry weapons.

It soon became clear that safe troop insertions could not rely on the Republic of Vietnam Air Force (RVNAF) and the ARVN to provide effective preparation of the landing zone (LZ) with air strikes and artillery. More heavily armed, agile helicopters were needed. Fifteen HU-1A Iroquois were armed to precede troop-carrying helicopters into the LZ and suppress ground fire. This innovation would revolutionize US Army tactics.

North Vietnamese Army (NVA) and VC troops were well prepared for the arrival of helicopters, although some inexperienced recruits found them intimidating. Many former Viet Minh fighters who had learned to use small arms and machine guns against French helicopters and fixed-wing aircraft in the 1950s knew that a few hits in their engines, fuel tanks, or hydraulic systems could bring them down. Anti-aircraft artillery (AAA) introduced in 1950 played a major role at the battle of Dien Bien Phu, when 80 guns were carried in pieces on foot and reassembled in fortified positions.

When the North Vietnamese acquired heavier weapons like the 37mm M1939 (61-K), it was possible to destroy an aircraft with a single hit. The NVA studied the early ARVN assault operations and identified areas for potential LZs. These were then surrounded by armed troops and the ground was spiked with sharpened stakes to penetrate helicopters that attempted to land.

By January 2, 1963, when ARVN troops landed at the village of Ap Bac to attack VC forces at nearby Ap Tan Thoi, the opposition had intensified and the defenders had heavy machine guns like the tripod-mounted 12.7mm DShM 1938 – four of the ten H-21As and an armed UH-1B were shot down by machine guns and mortars. The VC gunners then escaped before a follow-up air strike hit their defensive positions. For North Vietnam, this was proof that helicopter-based assaults could be defeated, and the event was exploited widely for propaganda and recruitment purposes.

A November 1963 CIA report stated, with a degree of shock, "Perhaps even more disturbing than the VC's continued offensive abilities is the evidence of a growing defensive capability against air-supported assault. A government operation on November 24–25 encountered heavy fire from what is believed to have been a VC anti-aircraft company prepositioned in anticipation, with the result that a number of aircraft were damaged or destroyed."

The defense of North Vietnam commenced with 16 batteries of German 88mm FlaK 18 guns supplied by the Soviet Union from captured stock in 1954. The NVA's AAA force was rapidly enlarged and deployed throughout the war zone. In 1971, when ARVN forces were airlifted into Laos, the light AAA opposition that helicopter pilots faced in South Vietnam and Cambodia was supplemented by 23mm, 37mm, and occasional 57mm weapons. Combined with multiple heavy machine guns and infantrymen with automatic weapons emerging from camouflaged foxholes close to an LZ, this in-depth opposition made helicopter operations extremely hazardous.

Throughout the war, helicopter crews expressed admiration of the bravery of NVA gunners who continued to return fire despite heavy bombing, rocket, and napalm attacks on their positions. These confrontations produced some of the most intense, bloody fighting of the entire Vietnam conflict.

CHRONOLOGY

1955

January Bell's Model 204 proposal for a US Army utility helicopter is selected in a design competition.

February 23 Nine HU-1 pre-production aircraft are ordered.

June Bell begins work on three XH-40 prototypes.

1956

October 20 Bell XH-40 55-4459 makes its first flight (on the same day that company founder, Lawrence Bell, dies), flown by Floyd Carlson. In 1956 XH-40s were re-designated XHU-1s.

1957

January 1 The Bell Helicopter company is established within Bell Aircraft at Fort Worth, Texas.

June 1 US advisors take over training of RVNAF pilots from the French. Its first helicopter unit forms in March 1958 with Sikorsky H-19s.

1958

August The first HU-1 flies.

1959

March 13 Bell receives an order for 100 HU-1As, and by March 1961 173 have been produced. The first 18 cost $28.7m.

June The first HU-1A flies, and service entry begins with the 82nd Airborne Division.

1960

April 27 The first HU-1B flies with an uprated engine.

July US Army pilots set seven new world records for helicopter flight.

July Five aircraft, one of them re-designated XH-1A, are used to test 2.75in. rockets, grenades, and 0.30-cal. machine gun installations for the attack role. Design work also begins on the HU-1C gunship (an uprated HU-1B) and seven prototypes of the upgraded HU-1D troop transports are ordered.

July Textron Incorporated buys Bell's defense activities.

1961

Summer The HU-1A is officially named "Iroquois" but is universally known as the 'Huey' in frontline service.

August 16 The first HU-1D flies.

1962

March HU-1As of the 57th Medical Detachment are the first US Army Hueys to arrive in Vietnam, preceded by a few CIA "Air America" examples.

September The Huey's designation is changed to UH-1.

September A UH-1A is tested with the XM5 40mm grenade launcher.

November Eleven UH-1Bs arrive in Vietnam, each armed with XM6 M60C machine guns and 2.75in. rockets. This becomes the standard US Army weapons fit for its Huey gunships, which are operated alongside unarmed troop-carrier UH-1Bs.

1963

February The 11th Air Assault Division tests the airmobile concept.

June Gunship versions are used by Special Operations Group personnel in Thailand and Vietnam and by the 20th Special Operations Squadron as the UH-1P gunship.

June UH-1Bs begin to replace H-21s in the 81st Transportation Company at Pleiku, South Vietnam, which is renamed the 119th Aviation Company (Air Mobile, Light) on June 14, thus becoming the first UH-1B transportation company.

August 9 UH-1D deliveries begin to the 11th Air Assault Division.

Male and female recruits were enlisted for North Vietnam's rapidly expanding AAA defenses. Heavy machine guns like the Soviet ZPU-1 (or Chinese-built Type 75), available from 1965, fired 14.5mm ammunition. The weapon could hit targets at an altitude of almost 4,000ft, and it was rightly feared by helicopter crews. (Dr. István Toperczer collection)

1965

February 7 Air strikes on North Vietnam begin in response to VC attacks on Pleiku.

May 7 The first US ground combat troops (173rd Airborne Brigade) arrive in South Vietnam.

June 15 The 11th Air Assault Division is renamed the 1st Cavalry Division (Airmobile).

June Delivery of the UH-1C "Frog" grenade-launching gunship begins, the helicopter being used as an interim measure pending development of the AH-1 Cobra.

September 11 The 1st Cavalry Division arrives in South Vietnam. UH-1C gunships commence combat in Vietnam shortly thereafter.

1966

April Work begins on the larger UH-1H variant.

April Bell receives the largest contract ever awarded by Army Aviation Material Command – $249,457,443 for 2,115 UH-1s.

1967

January "Lightning Bug"-armed UH-1D nightfighters are evaluated in Vietnam.

September Deliveries of the UH-1H begin. More than 5,000 are produced.

September Deliveries of AH-1G Cobras begin, although UH-1B/C gunships remain in use until 1971.

1968

January 30 The Tet Offensive begins, and lasts for more than three weeks, considerably reducing US public support for the war.

July 1 The 101st Airborne Division becomes an Airmobile division.

1969

June 8 The Vietnamization program begins.

The US Army's principal helicopter gunship in Southeast Asia was the UH-1C. This 192nd Aerial Weapons (Gun) platoon example was based at Phan Thiet in 1968. The unit (later re-designated the 192nd AHC) encouraged crewmen like John Inferrere to apply nose-art to their Hueys. (VAS084879 Richard M, Harris Collection, Vietnam Center and Archive, Texas Tech University)

1971

April 26 The 1st Cavalry Division (Airmobile) leaves South Vietnam.

November 12 Combat operations end but support for the South Vietnamese forces continues.

1972

March 10 The 101st Airborne Division (Airmobile) leaves South Vietnam.

1973

January 15 US participation in ground action ends.

January 27 The Paris ceasefire agreement is signed.

March 28–29 The 1st Aviation Brigade and the 180th Aviation Company (Assault Support Helicopter) leave South Vietnam, ending the airmobile presence in-theater.

DESIGN AND DEVELOPMENT

UH-1 HUEY

Derived from Bell's 1943 Model 30 two-seater design and the 1951 Model 47 (H-13), the Model 204 (XH-40) used the same two-blade rotor arrangement with a counter-weighted stabilizing bar. First flown on October 20, 1956, the XH/YH-40 design was the basis for the HU-1 Iroquois. The Model 533, modified in 1963 from YH-40 56-6723, had various types of three-bladed rotor. Fitted with two supplementary Continental J69-T-9 turbojets in 1964, it was the first helicopter to exceed 200mph. With more powerful Pratt & Whitney JT12A-3 jet engines, it reached 316mph in 1969.

The US Army awarded a contract in February 1955 for a utility helicopter with a mission radius of 100 nautical miles at 100 knots carrying an 8,000lb payload. At 42ft 8in. in length, it was sized to fit inside a C-130 Hercules. The Model 204 was the first helicopter to use a gas turbine engine, developed by Lycoming in the early 1950s under the leadership of Dr. Anselm Franz. During World War II, the talented German had designed the first production jet engine, the Junkers Jumo 004. A decade later, Franz's XT33 turbine, which initially developed 600shp, was lighter and more powerful than equivalent reciprocating engines and its transmission system was much simpler.

The engine could, in fact, be mounted above the fuselage, allowing for a greater internal payload area. The floor, with 140 sq ft of space, was near the ground for easy

Early HU-1As, identifiable by a short rotor mast, were used for armament trials. This example is firing Nord Aviation SS-11 (AGM-22B) wire-guided anti-tank missiles from its XM/M22 system, which was tested in March 1960 and aimed with an XM58 stabilized sight. (US Army Aviation Museum)

loading of up to eight personnel or cargo through large sliding doors on either side of the fuselage. Magnesium was used extensively in the helicopter's construction.

Model 204s were the first Bell helicopters to be built at the Fort Worth, Texas, plant, which had opened in 1951. An order for nine military HU-1s, with T53-L-1 engines derated to 680shp, followed, and in March 1959 173 similar HU-1As were ordered.

The HU-1B, built in response to US Army demands for a more powerful HU-1A, was delivered from March 1961. Its combat trials in 1962 included tests with several armament options. Many pilots considered the UH-1A/B underpowered for its troop-carrying task, for when carrying its design load of ten troops (each soldier having his full complement of kit so that even a slight ARVN soldier weighed around 170lb), the helicopter exceeded its maximum design weight by more than 200lb. This in turn adversely affected the UH-1A/B's maneuverability. Despite progressive power upgrades in each variant, early UH-1s seldom carried more than eight fully equipped soldiers. The addition of the full UH-1B gunship armament system also took the helicopter up to its maximum gross weight, but the additional drag of the external guns and rocket packs also reduced its maximum speed to around 80 knots. This made the gunship slower than the "slick" (troop-carrying) UH-1.

UH-1Bs were the most numerous helicopter gunships during the Vietnam War, but more powerful UH-1Cs became available from June 1965. Built as gunships, with an improved rotor system for better lift and maneuverability, they also had increased weight (including extra fuel) that largely negated performance improvements conferred by the T53-L-11 engine. After the first combat engagements underlined the UH-1's vulnerability to ground fire, the addition of up to 400lb of armor protection – the equivalent weight of two soldiers – often meant reduced fuel and troop loads.

Apart from the longer-bodied UH-1D and UH-1H troop carriers, there were few alterations to the basic Huey design before twin-engined variants began to appear in 1969. The capacious cabin with its long, rather fragile tail boom and strong landing skids was only slightly modified. The engine compartment could be adapted to take different powerplants, specifically two General Electric T58s for the USAF's UH-1F version and the Pratt & Whitney PT6T-3 (T400) Turbo Twin Pacs for the UH-1D-based UH-1N.

For the gunship variants, principally the UH-1B and UH-1C, the developments were mostly in the range of potential armament systems. These evolved under a procedure, used in a similar way since 1900, that usually gave them an "XM" prefix. As Rebecca Montgomery (TACOM LCMC) explained, "After an item has successfully passed development testing and is approved for production and fielding, it is officially type classified and the 'XM' becomes 'M'. In Vietnam, the great testing ground for military hardware, many items sent as development equipment had 'XM' designations and were never taken to type classification after the war ended. In some cases, it was

OPPOSITE

UH-1C 66-15089 *ROSEMARY'S BABY* flew with the 176th AHC "Muskets" from Chu Lai between April 1969 and February 1971. Accumulating 1,189 flying hours during that time, the helicopter was maintained by Crew Chief Owen "Butch" Brant.

UH-1C HUEY

53ft 0in.
15809
UNITED STATES ARMY
176
14ft 7in.
HUSKETS
53ft 0in.

UH-1Bs used the XM6 sub-system with M60C 7.62mm machine guns from 1963. The guns had a combined rate of fire of 2,200 rounds per minute and an effective range of 2,250ft. Twelve 500-round ammunition boxes could be carried. (US Army Aviation Museum)

because the item did not prove to be what the Army wanted and no more were planned for production."

Gunship armament options ranged from XM3 48-shot launchers for 2.75in. rockets in 1960, through the XM16 quad machine gun system to the XM200 19-shot rocket pod, with many other possibilities. Their extra weight pushed the Lycoming T53-L-11 to its limits, necessitating partial fuel and ammunition loads. Some pilots noted that the UH-1C lacked power to climb out after a gun run and found the excessive vibration fatiguing.

NVA/VC WEAPONRY

From 1958, North Vietnam's Anti-Aircraft Command had six regiments with 7,500 troops controlling 75mm, 90mm, and 100mm guns. In March 1959 the P-8 early warning radar was introduced and two radar regiments were formed. The North Vietnamese forces in 1961–62 included an Infantry Branch with six divisions, each with 9,590 personnel in three infantry regiments, an artillery regiment, and single anti-aircraft and anti-tank battalions equipped with specialized weaponry. They were supported by an engineer regiment whose troops were equipped with 5,000 SKS automatic rifles and AK and RPD machine guns, all firing the same caliber ammunition.

Infantrymen also had large quantities of American weapons acquired from South Vietnamese troops when they abandoned forward bases to the VC. Older weapons were inherited from the "French war" of the 1950s. Western weaponry included a

varied collection of Thompson sub-machine guns, semi-automatic Garand M1 rifles and Browning Automatic Rifles (BAR), together with plentiful supplies of ammunition and grenades.

From 1963, the NVA tried to standardize on infantry weapons that used readily available captured American ammunition. Captured 0.50-cal. M2 heavy machine guns were particularly prized, being used to great effect against helicopters, although the majority lacked a tripod mount for steady aiming. They had twice the range of the more common, Chinese-built, Type 67 7.62mm light machine gun and three times the destructive power, although their recoil made them hard for smaller NVA soldiers to control. However, troops could gain much credit by downing an American helicopter with an American weapon.

Siting heavy machine guns like this DShKM 1938/46 in foxholes and bunkers protected their crews from helicopter gunships. The NVA knew that one well-placed machine gun could dominate an entire LZ. (Getty Images/Bettmann collection 515099942)

Each battalion's 40 heavier AAA guns were communist-built 20mm and 37mm weapons, and the flow of such guns from China and the Soviet Union accelerated in 1964–65. During 1965–67, NVA and VC forces facing US helicopter assaults tried to standardize their weapons, favoring the simple and effective AK-47 assault rifle and the Degtyreva-Shapagina (DShKM) 1938/46 12.7mm heavy machine gun, the latter often being referred to as a "0.51-cal." by US forces. Soviet-supplied 81mm and 82mm mortars with a range of up to two miles could be placed near helicopter LZs. LZ defense forces also usually had access to B40 and B41 rocket-propelled grenades, one of which could easily destroy a UH-1. For most of the war, the "0.51-cal." heavy machine guns were the most effective weapons against US helicopters. Easily transportable, they could be set up in well-fortified bunkers, with two or three arranged to dominate a LZ. They were always primary targets for gunship crews.

From 1969–70, as North Vietnam rapidly moved its forces into Laos, Cambodia, and South Vietnam, the number of heavier AAA weapons increased. Helicopter crews were more often challenged by ZPU-2 twin 14.5mm guns or by 23mm and 37mm weapons, some of them radar-directed. Major strategic targets were increasingly defended by 85mm and 100mm guns in the final months of the war, but Huey gunships seldom had to fly into such "hot" defenses.

Troops showed considerable ingenuity in devising modifications to their equipment, such as this pivoting timber mount for a 7.62mm SGM heavy machine gun. It has a AAA sight fitted and is fed by 250-round belts. (Dr. István Toperczer collection)

TECHNICAL SPECIFICATIONS

UH-1 HUEY

The innovative T53-L-11 engine of the UH-1C developed 1,100hp but weighed only 500lb. It was essentially a jet engine with a 12in. fan in the exhaust stream that propelled the transmission via a drive shaft. The 48ft span main rotor had two metal blades with ballast weights at their tips, rotating at a basic 330rpm. Blades were timed for 1,000 flying hours, but in Vietnam they often needed changing after only 300 hours. Pilots had the standard "collective" (to the left of the seat) and "cyclic" controls for the main rotor and anti-torque ("rudder") pedals for the eight-foot span tail rotor. The main blades created high pressure below them and low pressure above, producing lift. When the helicopter was accelerating in level flight close to the ground, it developed additional "translational lift," usually vital to get a loaded Huey off the ground. Hovering a gunship over hot jungle terrain required considerable skill from the pilot.

The main rotor blades were strong enough to chop through foliage and fairly thin tree branches to enable a pilot to drop into a small forest clearing, and they could survive a bullet puncture. When static, the blades were tied down with purpose-built straps. In flight, they could handle positive "g" loads, but under negative g they could cut into the fuselage, possibly severing the tail boom.

A "slick" aircraft commander sat in the right seat, although both pilots were fully engaged at the controls in combat situations in case one was hit. For combat deployments, UH-1s had steel and ceramic laminate armor panels fitted under the

nylon mesh of the pilots' seats. On the outside face of the pilots' seats, an armored panel slid forward when the crew were strapped in. Pilots later received detachable chest armor ("chicken plates") to give them some protection from lighter gunfire aimed at the exposed front of the helicopter. Flak jackets were often spread in the chin transparency. From 1969, pilots were given the supposedly bullet-proof Ballistic Helmet, but many found it far too heavy to wear during combat. Parachutes were not provided.

A standard Huey "slick" crew comprised two pilots, a crew chief, and a door gunner. At a "hot" LZ with heavy ground fire, the crew chief usually manned one of the two M60 door guns, and any troops still aboard could contribute fire from their M16 carbines. Maximum fuel gave around 2.5 hours of flying time, but a lighter fuel load was usual to save weight. Gunships, laden with heavy armament, often had to refuel between "lifts" to an LZ more frequently than the "slicks," which meant that transport UH-1s had to wait for their escort before embarking on a second troop "lift." Ideally, lifts were meant to arrive at the LZ within a minute of each other, and for unusually "hot" LZs, extra gunships could be sent to patrol over the area between lifts.

HUEY VARIANTS USED IN VIETNAM

UH-1A

The first HU-1 had a 770shp Lycoming T53-L-1A turboshaft engine with 125 gallons of fuel giving a 163-mile range, increasing to 165 gallons and 382 miles in production HU-1A/UH-1Bs. Gross weight was 7,200lb, which increased to 9,500lb in the later UH-1C. Five conducted gunship trials with machine guns, rockets, and 40mm grenade launcher chin turrets in 1960. Fourteen were built as dedicated TH-1A trainers, but many early UH-1A/Bs were subsequently used for training. The 15 Utility Tactical Transport Helicopter Company (UTTHCO) HU-1As shipped to Tan Son Nhut in July 1962 were armed with 2.75in. MA-2 rockets (eight or 16) fixed to the rear of each skid and two fixed, forward-firing M2 0.30-cal. machine guns belt-fed from boxes in the cabin, using jury-rigged wiring and attachments.

UH-1B GUNSHIP

This improved version was tested in 1960 and deliveries began in March 1961. It had the uprated 960shp T53-L-5 engine, a 13in. taller rotor mast, and new aluminum honeycomb rotor blades, increased to 21in. in width. The counterweights, suspended below the UH-1A's rotor hub, were moved above the rotor. Improvements to the center of gravity and a 2ft 7in. increase in fuselage length enabled a 50 percent enlargement in cabin capacity, increasing gross weight to 8,500lb. Later production models had the 1,100shp T53-L-9 or T53-L-11 engine.

The original UTTHCO jury-rigged armament consisting of XM37 0.30-cal. machine guns and 16 USAF-supplied 2.75in. free-flight rockets attached to the HU-1A's skids. Many of the UTTHCO's innovations were devised by CWOs Cletus Heck, Womack, and Carter. An UTTHCO UH-1B was tested with four 19-shot XM159 rocket pods in 1964 as an alternative to the artillery XM3 system, but the weight was excessive for Vietnam conditions. (US Army Aviation Museum)

This UH-1B has been fitted with the "Lightning Bug" (later, "Firefly") system, which used a rig with seven C-123 landing lights to detect the enemy at night. It was tested by the 97th AHC in 1965. A 0.50-cal. door gun was also usually carried by "Lightning Bugs," while some "Fireflies" had the full XM16 quad gun and rocket armament fit. (US Army)

The UH-1B/C had a Universal Mount for armament, attached below the main cabin doors for pairs of XM6 M60 machine guns ("flex guns") or 24-tube XM3 2.75in. rocket launchers. Its basic XM6E2 gun system could be combined with XM157 front-loading, seven-tube rocket launchers as the XM16 configuration. From 1965 the rocket launchers were gradually replaced by rear-loaded XM158s with removable tubes. Rocket-equipped Hueys were used as aerial rocket artillery (ARA), equating to airborne versions of standard 155mm artillery guns. Rockets were fired by the pilot or co-pilot, with aiming via a Mk VIII sight – they could be shot off in pairs, in ripple firing, or in one massive volley. In combat, pilots often fired pairs as they closed in on a target. Although ARA UH-1Bs carried no fixed guns, a few had the M75 grenade launcher in an M5 chin turret.

119th Assault Helicopter Company (AHC) UH-1Bs sometimes carried napalm canisters or the XM31 system, which used two M24A1 20mm cannon pods firing at 700 rounds per minute per gun and effective at the same range as enemy "0.51cal." heavy machine guns. This armament's extra weight significantly reduced the UH-1B's performance and handling and the guns were prone to jamming.

Early attempts at developing night-capable UH-1Bs in 1964 included six hardpoints for flare launchers in field-rigged tubular mounts. In 1965 the 97th AHC experimented with a set of seven landing lights taken from a C-123 transport aircraft fitted on a frame in a UH-1B's cargo doorway. Several were thus equipped as "Lightning Bug" or "Firefly" target illuminators for other gunship helicopters. The 336th AHC used them against riverine traffic.

Some UH-1Bs of Maj Robert Webster's 282nd AHC added the XM22 anti-tank system to their range of armament in December 1969, with three SS-11 (AGM-22B) missiles each side on special launchers attached to the Universal Mount. They were fired by the pilot, with the gunner using an XM58 stabilized sight to aim the weapon and a small control column to steer it. They proved to be less effective and more difficult to use than the XM26 optically tracked, wire-guided (TOW) missile against targets like bunkers that were inaccessible to conventional weapons. Use was discontinued due to lack of armored targets, but revived in the 1972 Easter Offensive to attack NVA T-54 tanks. A total of 1,033 UH-1Bs were built.

UH-1B TOW

In 1967 five UH-1Bs were modified to fire XM26 50lb tube-launched TOW missiles from large pods mounted on either side of the helicopter. A telescopic sight was installed in the aircraft's nose. Deployed to Vietnam in the spring of 1972, the TOW UH-1Bs destroyed 26 tanks.

UH-1B/C "HEAVY HOG"

The XM5 system with an M75 40mm grenade launcher was fitted to either variant. It included a nose turret, supported by rods in the chin bubble and traversing 60 degrees left or right, elevating by 15 degrees and depressing 35 degrees. A special swing-down sight was installed above the left seat. Two XM159 19-shot rocket pods were usually added.

UH-1C "HUEY HOG"

This was essentially a UH-1B, conceived primarily as a gunship in 1960 and sharing the UH-1B's armament options. Its T53-L-11 engine drove a modified Model 540 rotor head with 27in. wide blades (which drooped visibly when static, unlike those fitted to the standard UH-1B) to increase speed and agility. A wider, modified vertical tail and larger synchronized elevators with reverse airfoil profiles were fitted. However, the helicopter was still underpowered when loaded with its full armament in a "hot and high" climate. Fuel capacity was increased to 242 gallons.

In combat, pairs of UH-1Cs could be configured as "Hogs," with a single helicopter carrying 48 2.75in. rockets, but no miniguns for ARA use, and a second machine as a "rocket and minigun" aircraft with XM21 armament consisting of 14 rockets and a pair of electrically operated GAU-2/A 7.62mm miniguns in place of the M60 "flex guns." Thus configured, the helicopter reached its gross weight of 9,500 to 10,000lb. Fully loaded, a UH-1C struggled to maintain 90 knots, and its never-exceed speed in a dive was 140 knots. Gun runs were usually commenced at 80 knots, and rockets were fired in an almost flat trajectory from an altitude of around 200–300ft, with the UH-1C flying in its normal "nose low" attitude.

UH-1Cs entered combat service with the 240th AHC's 3rd Gunship Platoon at Long Binh. One 25th Aviation Battalion UH-1C had long tubular booms attached to either side of the fuselage, with metal detectors fitted at their ends. These were used to find enemy arms caches, which could then be destroyed by other gunship helicopters. The first production UH-1C (64-14105) tested the Oerlikon SURA-FL rocket, with 40 carried on its XM16 armament mount. A total of 750 UH-1Cs were built.

The 173rd AHC "Robinhoods" had UH-1Cs for its "Crossbows" gunship platoon, armed in this case with the XM21 weapons system – standard for UH-1Cs from 1966. The "Robinhoods" were assigned to the 11th Combat Aviation Battalion from 1966 to 1972 at Lai Kai, where their HQ was known as "Sherwood Forest." (US Army Aviation Museum)

UH 1C

1. Avco-Lycoming T53-L-11A engine
2. Annular air intake
3. Main gearbox
4. Twin M60C 0.30-cal. (7.62 mm) machine guns
5. Ammunition feed belt
6. Ammunition magazines
7. Gun swivel mount system
8. Crew seating bench
9. First aid kits
10. Pilot's seat
11. Cyclic pitch control column
12. Collective pitch control column
13. Center control panel console
14. Instrument panel shroud
15. Rudder pedals
16. XM60 reflex sight
17. Radio and avionics equipment

UH-1C "FROG HOG"

This variant, introduced in 1965, had XM158 2.75in. rocket packs and a 40mm XM5 grenade launcher system in a nose turret. If 19-shot XM159 rocket pods were carried, the aircraft would be known as a "Heavy Frog"/"Hog." Such armament usually required a significantly reduced fuel load.

UH-1C NIGHTHAWK

This nightfighting version was based on the success of the widely used Starlight night vision scope. In 1966, four UH-1C "Batships" were fitted with the Remote Image Intensifier System, similar to the Night Observation Device which had been effective in the USAF's fixed-wing gunships, as had the AN/VSS-3A Xenon searchlight. The latter could offer normal light transmission or infra-red for use at night. The aircraft had an M134 minigun to attack any targets it detected. In standard UH-1s, night vision was badly affected by the illumination from the cockpit instrument panels, so night flying was generally avoided. Some UH-1Cs had uprated T53-L-13 engines and were re-designated as UH-1Ms to support Iroquois Night Fighter and Night Tracker (INFANT) UH-1s.

UH-1D

First flown in August 1961, the UH-1D transport was lengthened by 3ft 5in. to accommodate up to 14 troops (in an emergency) in a fuselage 41.5ft long. Most had the uprated 1,100shp T53-L-11 or 1,400shp T53-L-13 engine (with dust filters). Maximum speed was 120 knots. The UH-1D set 21 Class E-1 world performance records. Standard UH-1D "slicks" had two tripod-mounted M60 door guns, each firing 550 rounds per minute. In 1968, at least one 116th AHC UH-1D had an unauthorized 20mm gun installation between its skids, which destroyed the chin bubble transparencies when it was fired for the first time. A total of 2,008 UH-1Ds were built.

The similar UH-1H version had the T53-L-13 engine and a crash-proof fuel system. More than 5,000 were built from 1967, and examples remained in service with the US Army well into the 1980s.

UH-1D "HEAVY HOG"

Although essentially a "slick" troop transport, the UH-1D had four hardpoints for external fuel tanks or armament. Several were duly modified as gunships. Two M60D guns were frequently mounted on the aft hardpoints. No. 9 Sqn of the Royal Australian Air Force (RAAF), flying from Vung Tau, fitted its "Bushranger" UH-1Ds with a pair of miniguns firing at 4,600 rounds per minute, two M60 door guns and two seven-tube 2.75in. rocket launchers mounted on sponsons extending above the skids. Similarly-armed UH-1D gunships were passed on to South Vietnamese units.

UH-1E

Despite fears that purchasing armed helicopters would jeopardize funding for fixed-wing aircraft, the US Marines Corps insisted on its own gunships to protect air assault helicopters. Its UH-1E was based on the UH-1B, with the addition of a rotor brake to prevent the blades from turning on deck in a wind and a cargo or rescue winch attached to the right side of the cabin. Most of the magnesium structure used

This UH-1E boasts a TAT-101 turret, housing twin M60C guns, and TK-2 mounts for 19-shot rocket pods. The turrets tended to jam and were removed in 1970. Gunship UH-1Es usually flew without their main cabin doors and rescue winch housing on the roof (partly covered by the national insignia) to save weight. (Ray Wilhite via Wayne Mutza)

in US Army Hueys was replaced by slightly heavier corrosion-resistant aluminum. Electrical systems were changed from US Army direct current to the US Navy's alternating current.

Six UH-1Es were equipped as gunships with a Temporary Kit (TK) 2 Ground Fire Suppression weapons fit comprising two M60C guns and a 2.75in. rocket pod on each skid. From April 1967 they also had the Emerson TAT-101 nose turret with two M60s – the first operational gun turrets to be used in a Huey. UH-1Es were used from May 1965 to April 1972, and 209 were purchased. The US Navy procured 27 HH-1K air-sea rescue versions of the UH-1E in 1969.

UH-1F

In 1963 the USAF ordered a UH-1B derivative, re-engined with the 1,325shp General Electric T58-GE-3 driving a UH-1D main rotor. Some were camouflaged and supplied to the 20th Special Operations Squadron in Thailand for covert operations. A total of 119 were built.

UH-1L

Eight UH-1Ls were acquired in 1968 as the US Navy's trainer versions of the UH-1C. For Operation *Game Warden* (a joint operation conducted by the US Navy and the Republic of Vietnam Navy aimed at denying the VC access to resources in the Mekong Delta), they were all armed for riverine gunship missions. Forty-five TH-1Ls, also procured in 1968, became the US Navy's advanced helicopter trainer.

UH-1M INFANT

The Iroquois Night Fighter And Night Tracker (INFANT) AN/ASQ-132 system was installed in four gunship UH-1Hs, the fitment including low-light level television periscopes, night vision sensors, 500 watt Xenon infrared searchlights, and the 1,400shp Avco Lycoming T53-L-13 engine. 66-511, 66-584, 66-703, and 66-726 commenced combat testing in 1969 and, the following year, served with the

11th Combat Aviation Group, 1st Cavalry Division (Airmobile), and "A" Company of the 25th Aviation Battalion.

Its XM21 weapon system comprised two 7.62mm miniguns and two seven-tube rocket launchers. By 1971, some UH-1Ms had the more advanced AN/AAQ-5 Forward Looking Infra-red (FLIR) fire control system, with a powerful IR sensor attached to the XM5 nose-turret hardpoints that projected its imagery onto a TV screen in the rear cabin. They often operated at an altitude of 600ft, with an AH-1G for top cover and a higher-flying UH-1H flareship, catching troops in the open. INFANT crews hoped to catch enemy soldiers by surprise in the open while they concentrated on the top cover helicopters, the location of the all-seeing UH-1M not being revealed until it opened fire. In 1971 the IR sensors were used to detect recently buried "warm" landmines.

UH-1P

Twenty USAF UH-1Fs were modified as gunships with two GAU-2B/A miniguns on flexible mounts in the cargo doorway and two XM157A seven-round rocket pods on the skids. They were used in Vietnam by the 20th Helicopter Squadron, flying from Nha Trang AB.

ABOVE LEFT
The UH-1M INFANT – this example being seen on September 4, 1969, probably at Fort Rucker – was a UH-1C variant with the AN/ASQ-132 night vision system in its nose. Four platoons in Vietnam were eventually issued with the helicopter, although the equipment made it nose-heavy, reducing the UH-1M INFANT's agility in the gunship role. (US Army Aviation Museum)

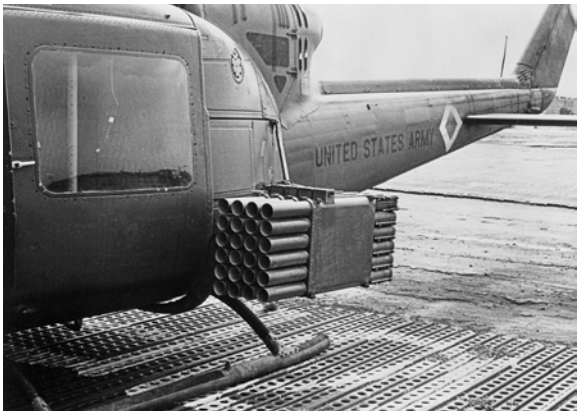
ABOVE RIGHT
A pair of 20th Special Operations Squadron UH-1Ps (65-7929 in the foreground), their USAF camouflage blending in with the terrain. The changes to the engine compartment necessitated by conversion to the T58-GE-3 are evident. (USAF)

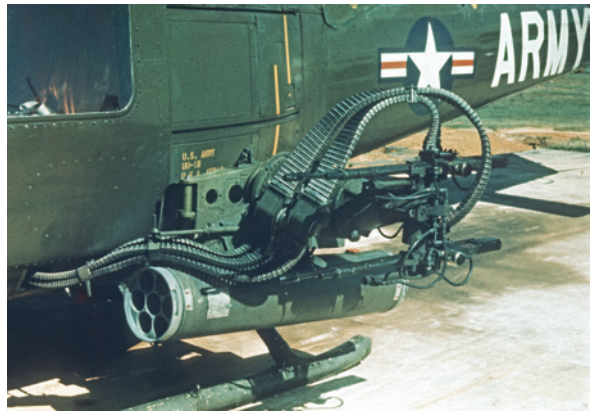
UH-1 ARMAMENT

ROCKETS

By 1969 the five-foot-long, 2.75in. rockets used by gunships had Mk 40 motors and screw-on ten-pound Mk 151 or, less often, longer 17lb Mk 229 high explosive warheads. XM423 impact fuses or XM429 proximity fuses were attached. Two 19-shot XM159 or XM200 tubes were loaded on gunships that were prioritized for ARA carrying. So was the earlier XM3 system, with 24-rocket pack "boxes" on either side attached directly to the Universal Mount and aimed via the pilot's M3 Infinity Reflex Sight.

Seven-tube XM157 (used with the XM6 system) or rear-loading XM158 launch tubes were designed to make rockets spin slowly after launch in pairs or alternately to maintain stability after their spring-loaded folding fins deployed. Damage to one fin in flight could make a rocket deviate sharply (as a "spinner"), causing potential injury to friendly troops in a close support situation.





ABOVE LEFT
XM3 rocket packs were used by ARA UH-1B/Cs, their 24 2.75in. rockets initially being packed four-deep in two stacks on either side of the fuselage. However, single "four-by-six" packs, as seen here, were used from 1963. Lt Gen John Hay reported that during an attack on the 1/9th Cavalry's base on November 3, 1965, it was "the first time a perimeter under heavy fire had been reinforced by heliborne troops air assaulted into an unfamiliar LZ. It was also the first time that aerial rocketry was used at night, and as close as 50m to US troops." (US Army Aviation Museum)

ABOVE RIGHT
XM16 system M60C "flex guns" were frequently combined with the XM157 seven-shot rocket pod on an MA4A bomb-rack, as seen on this UH-1B. The pod was succeeded in 1966 by the similar XM158 with exposed replaceable tubes. (US Army Aviation Museum)

Flechette warheads (known as "nails") were occasionally loaded. They contained 2,200 20-grain steel darts, fired over a wide area in two fore and aft bursts. White phosphorus warheads were also available to drive enemy troops from cover and marker smoke warheads could be fitted. If "flex guns" or miniguns were installed, the rocket pods were usually the seven-shot versions to save weight. The simplicity and hitting power of rockets were often preferred to the more complex fixed guns, even though they lacked accuracy beyond 3,000ft.

DOOR GUNS

Gunships had two door-gun M60C/D machine guns, often fitted with "flex gun" butt plates rather than infantry stocks, to cover the sides and rear of the aircraft. "Slick" gunners usually used ammunition "cans" for their guns, while gunship crews had about 1,000 rounds of belted ammunition passing through feed adapters on the weapons. M60A guns were hung from flexible bungee cords, giving an unlimited field of fire, while M60Ds were fixed to "Sagami mount" pintles attached to the Universal Mount. This restricted the field of fire, but prevented bullets hitting the rotor or entering the cabin. At night, the barrels could glow red after firing, and they needed changing with asbestos gloves on. A few M16 rifles, captured AK-47s, or shotguns were usually stowed in the cabin for self-defense if the gunship was shot down.

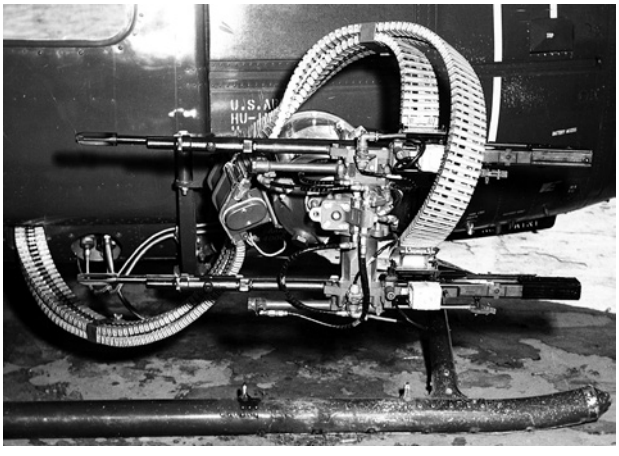
FIXED GUNS

The UH-1B's Emerson XM6E3 Quad gun or "flex gun" system was originally known as the XM153 or XM6E2 when attached to a HU-1A. From May 1963 it became the XM16 Armament Subsystem fitted to the XM156 multi-armament mount, which incorporated the pilot's XM60 rocket sight above the windshield.

For "flex guns," the XM156 used a hydraulic turret either side of the fuselage. Two M60CA1 7.62mm machine guns were attached each side, controlled and triggered by the co-pilot/gunner via a pantographic sight lowered from the cabin ceiling. The guns were fed by linked rounds along electric motor-driven flexible metal chutes passing through the cabin floor from 500-round boxes in the cabin, with separate boxes for each gun to a total of 5,434 rounds. The flex drive allowed the helicopter to fire at targets on either side of its flightpath. They could be depressed by 85 degrees, elevated ten degrees, moved ten degrees inboard and 70 degrees outboard, or locked in the

forward-firing position to be operated by the pilot using his Mk VIII sight. In an emergency, such as a forced landing, the guns could be removed and used as hand-held weapons.

George J. Coombs served with the 119th AHC's gunship platoon in 1965, and he recalled firing "flex guns" at night. Ahead of the attempt to investigate the source of mortar attacks on his base, he checked his guns. "As I moved my flex sight I could see the four machine gun muzzles move to where I was looking. The pilot lined up for a north–south run and told me to start the show. I squeezed the triggers and four machine guns spat flame into the night. I could feel the helicopter vibrate. The noise in the night stillness startled me." No returning fire was received.



The XM6 system, fitted here to a HU-1B, consisted of four M60C 7.62mm machine guns that could fire up to 650 rounds per minute from ammunition trays holding 6,400 rounds. (US Army Aviation Museum)

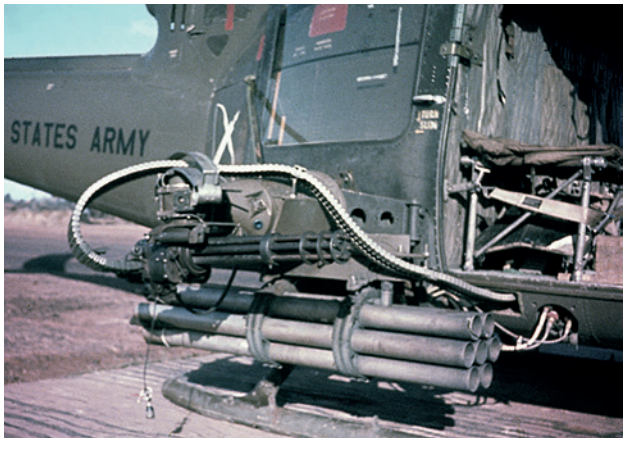
In the UH-1C, "flex guns" were replaced from 1965 by the XM21 system with a single M134 GAU-2B/A electrically-driven, six-barrel minigun on each side, fed from two ammunition boxes through the cabin floor. These guns were often heavy on maintenance. They fired for three seconds, requiring another push on the trigger button for each burst. If the pilot's sighting system was used the miniguns turned, coordinated with the sight. If the sight moved to the right, the left gun would stop firing to avoid hitting the fuselage and the right gun would then double its rate of fire to 4,000 rounds per minute, and vice versa. More often, pilots aimed straight ahead or down. Ammunition (up to 9,000 rounds) was contained in four trays on the cabin floor which were periodically reloaded by the gunner and crew chief.

The XM21 system most commonly partnered the M134 miniguns with XM158 seven-tube rocket launchers on UH-1Cs. It was possible to use up a gunship's ammunition very quickly, particularly with miniguns.

The 173rd AHC was the first unit to take XM21-equipped UH-1Cs to Vietnam in 1966. Two M134 miniguns replaced "flex guns" and the universal mount supported a seven-tube XM158 2.75in. rocket cluster. Ammunition belts were fed through an aperture in the lower fuselage. (Elwood Sergent/US Army Aviation Museum)

M75 40mm GRENADE LAUNCHER

Nicknamed "Thumper" or "Chunker" due to its sound and slow rate of fire, the M75 was installed in a spherical turret in the noses of some "Frog" UH-1B/Cs. The weapon's 150 rounds of M79 40mm grenades were split evenly between two ammunition boxes installed in place of machine gun ammunition. The M75's rate of fire was 220–240 rounds per minute, an electric motor pulling the grenades from the boxes (or a 302-round drum in later versions). They passed between the pilots to the launcher, often with manual assistance. The M75 could lack accuracy, and had to be fired with the helicopter in stable forward flight. The weapon required considerable maintenance, and its vibration could cause splits in the forward fuselage structure. Gunship pilot Al DeMailo liked the weapon:



OPPOSITE
The DShKM 1938/46 "Dushka" 12.7mm ("0.51-cal.") heavy machine gun was dubbed the "helicopter eater" in Southeast Asia. Firing bright red-orange tracer rounds "as big as baseballs," the "Dushkas" encountered in-theater were Chinese-built copies of the Soviet weapon. Tracers were loaded alternately with high explosive rounds, and a hit from a tracer in a UH-1's fuel tank could destroy it. "Dushkas" could reach up to 3,000ft – well within the helicopters' operational envelope.

My favorite ship was '053. It had a 40mm on it. It was a re-built UH-1B. It was able to pick up a lot of weight because it had the same rotor system as the UH-1H. I thought the 40mm was a much more versatile weapon. Your miniguns didn't have much penetration power against the bunkers. They jammed quite a bit. They were good against troops in the open, but a 40mm could get into a bunker. You could pound a bunker with it and blow a hole in it. For trench lines it was good. Guys would just come flying out. It was much easier to reload too. It did throw shrapnel over a 15m radius.

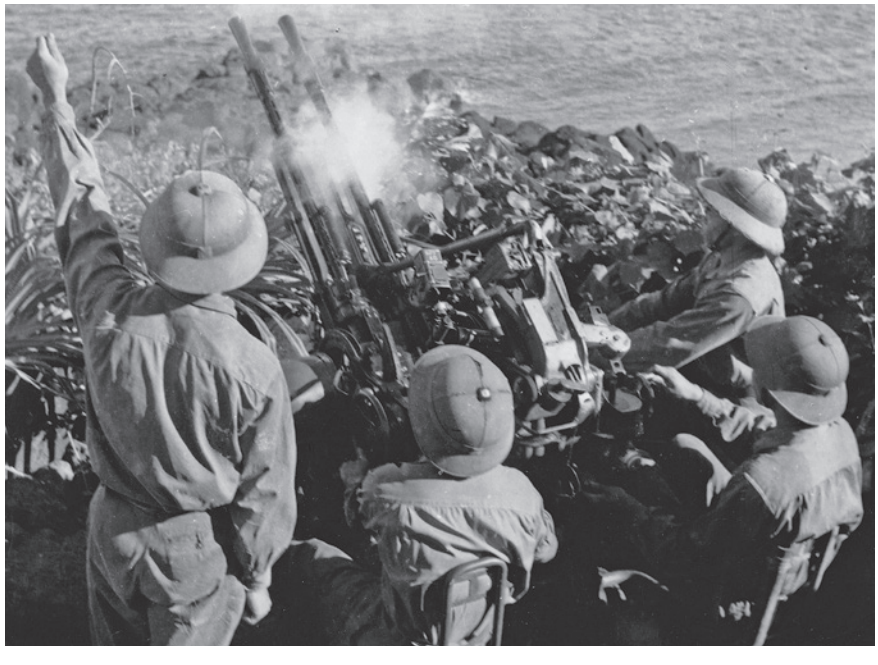
HAND GRENADES

Amongst the gunship crews' more technically advanced armament, the hand grenade remained a vital weapon. Door gunners and crew chiefs held activated colored smoke grenades out of their doors to mark the path to an LZ (often burning their hands in the process) and dropped them to mark the spot for the first "slick" to land. They could also lean out and drop fragmentation grenades into enemy machine gun bunkers that were inaccessible to rockets or miniguns, or throw white phosphorus grenades onto wooden boats or structures.

NVA Weapons

MORTARS and ROCKET-PROPELLED GRENADES

Soviet-supplied 81mm and 82mm mortars could deliver 7.5lb high explosive and fragmentation warheads into a group of static helicopters or advancing troops from relatively secure launching positions. For attacks on ARVN bases or US helicopter airfields, sustained nocturnal mortar attacks caused considerable damage, and their



The four-man crew of a ZPU-2 14.5mm heavy machine gun in action. The quick-change barrels could fire up to 600 rounds per minute, but were usually limited to 150. Based on the Russian M-4 design of World War 2, the ZPU-2 had two wheels for towing over rough ground – these folded sideways when the weapon was in the firing position. (Dr. István Toperczer collection)

launching squads could withdraw before helicopter gunships could take off to detect them. Hanoi also supplied 57mm and 75mm artillery guns, mainly for use against armored vehicles. RPG-2 and RPG-7 (known to the VC as the B-40 and B-41, respectively) 85mm rocket-propelled grenades, derived from the German Panzerfaust anti-tank weapon, were also devastating.

MACHINE GUNS

Soviet 12.7mm ("0.51-cal.") DShKM 1938/46 "Dushka" machine guns were copied in China from 1949 onwards, and large quantities were shipped to VC

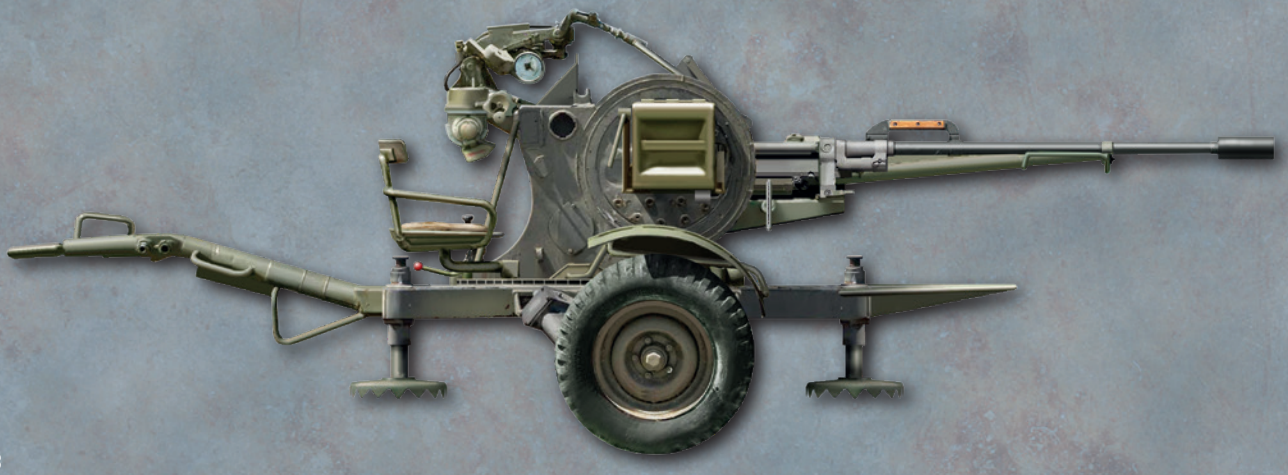
This well camouflaged M1939 (61-K) gun is about to fire a five-round clip of 37mm ammunition. Sometimes situated near a helicopter LZ, these weapons were encountered more often near towns or in Laos. However, from 1970 onwards, they threatened airborne operations throughout Vietnam. (Dr. István Toperczer collection)

BELOW

The Soviet-built Zetinaya Ustanova ZU-23-2 "Sergei" was widely used by the NVA. Originating in 1957, the weapon was designed to hit low-flying targets like helicopters. Although initially quite rare, the ZSU-23-2 was increasingly encountered around LZs, particularly in Laos, from the mid-1960s. Weighing 2,094lb and ten feet in length, it was towed behind a light truck or manhandled over rough terrain. The ZU-23-2 needed a crew of two, and its gas-operated action could fire at a minimum of 400 rounds per minute from two 50-round ammunition boxes. The weapon's effective range was two miles.

insurgents. From 1964 they began to replace captured Browning 0.50-cal. M2 weapons, and the "Dushka" became the most feared and effective anti-helicopter weapon because it had an anti-aircraft sight and a stable, tall tripod that allowed the gunner to keep the gun steady. As gunship pilot Al DeMailo recalled, the 12.7mm was a principal concern as it "could be fired flat over the LZ. What you

ZSU-23-2



AK-47

1. Front sight
2. Muzzle brake
3. Bayonet
4. Gas piston and recoil spring
5. Rear sight
6. Machined steel receiver
7. Selector switch
8. Firing mechanism
9. Trigger mechanism
10. Clip-in magazine
11. Stock

worried about was the anti-aircraft fire, the '0.51-cals', because they could reach you if you were at low level. You knew they had a range of a mile. Usually, the gunships used to skim the trees wherever we went because we were always looking for trouble."

The "Dushka's" armor-piercing incendiary ammunition, with its green tracer bullets, was lethal to helicopter engines (which had partial armored protection) and tail rotor transmission systems, which were unprotected to save weight. Huey fuel tanks were not self-sealing and there was no fire suppression system. Ruptured fuel tanks usually exploded, destroying the Huey. For crews, "0.51-cal." hits often meant death rather than injury, as the big bullets, pumped out at a heartbeat rate from a "helicopter eater" DShKM 1938/46, could penetrate chest armor. By 1965 there were enough US or Soviet heavy machine guns to provide three for each NVA platoon, which was the same in size as a US Army platoon.

The equally destructive ZPU-1 or ZPU-2 (twin-barrel) 14.5mm weapons were in use from 1964. Capable of firing 550-600 rounds per minute, the one-ton unit was towed on two large wheels and effective at distances of up to 4,500ft.

HEAVY ANTI-AIRCRAFT WEAPONS

In South Vietnam the 37mm M1939 (Chinese Type 55) gun was sometimes encountered before 1971, but helicopters flying over the Ho Chi Minh Trail or

ABOVE

The Kalashnikov AK-47 was one of the weapons most frequently faced by US helicopter crews. In production from 1947, more than 100 million AK-47s were built – most of them outside the USSR, such as the Chinese Type 56 supplied to North Vietnam. Its simple design made the assault rifle extremely reliable. It required minimal maintenance in primitive conditions. Although slightly less accurate than weapons made with more precise manufacturing tolerances, the AK-47 was ideal for close-in fighting at 300–400m around a helicopter LZ, where it could be rapidly reloaded. The weapon's barrel and firing chamber had phosphate coating and chrome plating to resist corrosion and chemical deposits – problems that caused the early American M16 assault rifles to jam.

Many Mauser MG 34 7.92mm machine guns with captured French or German origins were used by both the NVA and the VC. Mounted on a tripod for anti-aircraft use, the recoil-operated, air-cooled weapon could fire up to 900 rounds per minute. (Dr. István Toperczer collection)

Cambodia were more likely to be targeted by them. As NVA forces gradually took over South Vietnam after 1971, a wide range of 57mm, 85mm, and multiple 23mm guns became threats. Gunship crews resorted to extreme low altitudes to avoid these heavier weapons.

SEMI-AUTOMATIC WEAPONS AND RIFLES

From 1967, VC battalions exchanged their wide selection of captured US and French weapons for Kalashnikov AK-47 assault rifles, as provided to regular NVA troops. The AK-47 matched the US M16, was more reliable and quite capable of penetrating a helicopter's thin skin. The RPD 7.62mm light machine gun was also used in its original Soviet, or Chinese copy versions. Of World War II vintage, it was fed by 50-round ammunition drums or belts at 700 rounds per minute and was effective at distances up to 3,000ft.

SURFACE-TO-AIR MISSILES

The Soviet SA-2 "Guideline" was a significant threat to all fixed-wing aircraft, but helicopters flying at lower altitudes were relatively safe. The SA-7 "Strela-2" shoulder-launched IR-homing missile, encountered from 1972, could lock on to the exhaust emissions of a helicopter, but the chances of engaging low-flying helicopters in time to set up a "Strela" launch were limited. As a precaution, some UH-1s had their engine exhausts modified to direct the heat upwards.

THE STRATEGIC SITUATION

Operation *Rolling Thunder* inflicted considerable, though temporary, damage to North Vietnam's industrial infrastructure and defenses, but it hardly reduced the flow of troops and supplies to the rapidly expanding VC and NVA forces in South Vietnam. After well-planned attacks on strategic hamlets, US bases, outposts, and firebases, the guerrilla forces could melt away into the jungle or retreat to safe base camps in Cambodia or Laos, rather than facing US and ARVN troops in sustained open battles. It was therefore necessary to seek them out, cut off their retreats and provide speedy relief to threatened outposts.

Airborne forces were the ideal method of moving relief troops rapidly in difficult, well-defended terrain. From 1963 they deployed to a country that would be divided into four military areas or Corps. In the far north, stretching from Da Nang to the demilitarized zone (DMZ), was I Corps (pronounced "eye Corps"). II Corps covered a massive area, including the central Highlands of South Vietnam, III Corps included the smaller, more populous region north of Saigon and IV Corps controlled the south of the country, including the Mekong Delta.

The 1st Air Cavalry Division (Airmobile) was to be the primary instrument to counter Hanoi's insurgency. For the earliest HU-1 gunship combat deployment in 1962, the 53rd Aviation Detachment, with 15 HU-1As, was used to form the UTTHCO to escort H-21s from 3 August. An Army Concept Team studied the armed helicopter's role throughout their operations and defined three phases of the mission – en route (at a safe height); approach (descending to ground-hugging altitude a few miles from the LZ) and landing (suppressing ground fire). The third

The markings of the 174th AHC "Sharks" (applied with permission from the World War II-era 23rd Fighter Group, better known as the "Flying Tigers") give UH-1M 64-14140 a fearsome face as it makes a typically nose-down take-off from Duc Pho in 1970. This helicopter had previously been nicknamed both "Cobra" and "Woodstock." (Robert Brackenhoff)

phase was seen as the most useful, with enemy gunfire effectively reduced by the gunships.

Tactics evolved at that time included a "fire team" pair of gunship UH-1A/Bs to support the troop carriers. Several teams were needed for large-scale troop insertions, and at least one advanced to check the proposed landing site and "prepare" it by firing guns and rockets into actual or suspected enemy ambush locations. As UH-1As lacked wiring and hard-points for armament, the first armed UH-1Bs arrived for the UTTHCO on November 20, 1962, complete with universal mounts for weapons systems.

The Army's Transportation Companies changed their structure in 1963, with H-21 Shawnee helicopters being replaced by more agile UH-1Bs. As Aviation Companies, they each consisted of four platoons equipped with eight helicopters per platoon. Three platoons per company flew unarmed "slick" UH-1B troop lifters and the fourth had gunship UH-1Bs. Each Company maintained 25 gunships including a spare, but damage and attrition often meant that the full number was unavailable.

A typical assault formation comprised nine "slicks" and four gunships, the latter flying beside and slightly ahead of the transport Hueys to suppress ground fire before the landing. Once the unprotected troop lifters were on the ground, they were extremely vulnerable to enemy gunfire. Well disguised NVA or VC gunners would await that moment before opening fire and revealing their positions to the gunships, so heavy, general suppressive fire was required to prepare for a landing.

The 1st Cavalry Division (Airmobile) was intended to be the first of a series of multi-purpose airmobile divisions. President Lyndon B. Johnson was determined to

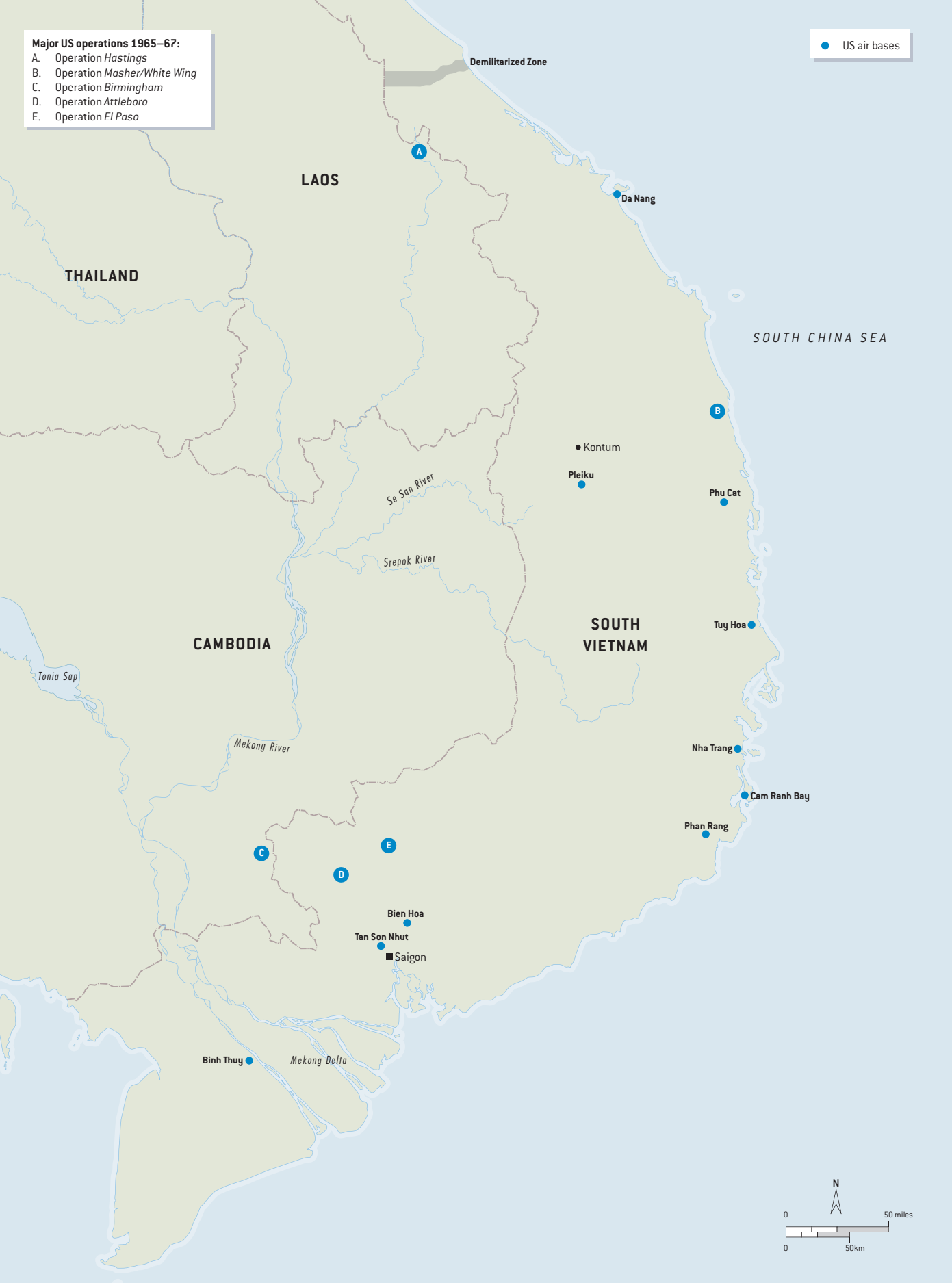
An assault force approaches an LZ near Chu Lai in November 1967. Explosions visible ahead of the "slicks" indicate "prep" work by the gunships. The Air Cavalry issued the instruction to its crews to "ALWAYS consider the area to be hostile" when flying in South Vietnam. (Getty Images/ Bettmann collection 515039800)

commit the 1st Cavalry Division to action, less than a month after its activation on July 1, 1965 through the combination of the 2nd Infantry Division with the 11th Air Assault Division (Test). The 173rd Airborne Brigade and the 1st Brigade, 101st Airborne Division had been the first US Army airborne units to be deployed to Vietnam earlier that year, and they used helicopters for troop movements. By 1968 the 101st had also reorganized as an Airmobile Division, and it redeployed to Vietnam in that form.

On July 28, 1965 the 1st Cavalry Division's 16,000 personnel and 420 helicopters – UH-1B/C/Ds, OH-13S Sioux for light observation and reconnaissance, and heavy lift CH-47A Chinooks (useful for retrieving downed Hueys), with CH-54 Tarhe "skycranes" (capable of retrieving a Chinook or two Hueys in a single lift) – were shipped to central Vietnam. This required four aircraft carriers, six troop ships, and a fleet of cargo vessels. As the "First Team," the 1st Cavalry Division managed the world's largest assembly of military rotary wing aircraft at the time.

Traditionally, the US Army used its cavalry elements mainly for battlefield reconnaissance. Prior to World War II, units such as the 1st Cavalry Division were horse cavalry regiments, but they reverted to infantry status for that conflict. It had three "cavalry" elements during the Vietnam War, namely air cavalry, airmobile infantry, and armored cavalry. They became airmobile light infantry, initially conducting airborne reconnaissance ahead of a main battle force.

In 1964, the first air cavalry squadron – 3rd Squadron, 17th Cavalry, 11th Air Assault Division – was activated. When the 11th Air Assault Division was renamed


Major US operations 1965–67:
A. Operation Hastings
B. Operation Masher/White Wing
C. Operation Birmingham
D. Operation Attleboro
E. Operation El Paso
US air bases
Demilitarized Zone
LAOS
THAILAND
CAMBODIA
SOUTH VIETNAM
SOUTH CHINA SEA
Da Nang
Kontum
Pleiku
Phu Cat
Tuy Hoa
Nha Trang
Cam Ranh Bay
Phan Rang
Bien Hoa
Tan Son Nhut
Saigon
Binh Thuy
Se San River
Srepok River
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A
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the 1st Cavalry Division the squadron became the 1st Squadron of the 9th Cavalry (1/9 Cavalry). Its success after arriving in South Vietnam in August 1965 led to the formation of four more similar "Real Cav" units. From 25 May 1965, the increasing numbers of airborne units led to the establishment of the 1st Aviation Brigade to manage seven aviation groups, 19 battalions, and four Air Cavalry squadrons.

The main base, for 435 helicopters, was in the An Khe Valley near the port of Qui Nhon, from which elements would frequently detach to other smaller locations, reducing the overall troop requirement. The US Army maintained numerous firebases with code names like "Cannon," "Blaze," and "Bastogne" on high ground throughout the country. Housing heavy artillery detachments, they provided immediate fire support for troops and "prepped" LZs ahead of an airborne assault. They needed frequent re-supply by Chinook and Huey helicopters and close air support by gunships when enemy forces tried to invade them. The VC quickly learned methods of disrupting landings, and the 3rd Brigade had to issue warnings about booby-trapped LZs, recommending that:

Although the presence of the North Vietnamese national flag suggests this photograph was posed for the purposes of propaganda, the embedded position of this DShKM 1938/46 heavy machine gun crew typifies the locations in treelines around helicopter LZs. (Dr. István Toperczer collection)

1. If possible, avoid using the same LZs more than once.
2. If possible, select the latest obvious-looking LZs.
3. In areas where numerous booby traps have been encountered, all LZs should have an artillery prep, even though they look innocent and are lacking in vegetation. It is recommended that an additional five minutes of artillery be fired.

Until the Tet Offensive in 1968 spread the war throughout South Vietnam, airborne assault operations tended to be concentrated on areas which were most widely occupied by VC insurgents, such as the A Shau Valley, which flanked the Ho Chi Minh Trail infiltration routes. Under the leadership of Gen Paul D. Harkins (commanding general of Military Assistance Command–Vietnam [MACV] from January 1962, and principal aide to Gen George Patton during World War II), the US policy from 1962 became one of attrition. This was based on the supposition that superior American and South Vietnamese forces would always inflict heavier casualties on the NVA than they would themselves receive, eventually forcing North Vietnam into defeat or negotiations.

This strategy, based on World War II experience and using ever-increasing numbers of American troops, was continued by Gen William Westmoreland when he succeeded Harkins in June 1964. Indeed, the "kill ratio" of US/ARVN troops compared with

North Vietnam's wide variety of weapons included Vickers-type water-cooled machine guns, fitted here with an anti-aircraft sight. White uniforms and reed helmets were usually for militia and recruits. A deep bunker is visible in the background. (Dr. István Toperczer collection)

enemy casualties became the measure of perceived success. In Westmoreland's case, that ratio was to be achieved favorably by using US troops rather than relying on the ARVN. Harkins had confidently forecast that his approach would win the war within three years, with US support being phased out in 1965. His optimism was endorsed by Robert S. McNamara.

The policy of attrition consistently underrated North Vietnam's determination and its ready supply of replacement troops. It also took little account of the South Vietnamese rural population, for whom the civilian casualties, uprooting of communities, and loss of livelihoods inherent in constant attrition gradually turned many of them against the Americans. However, after the first major airmobile operations at Plei Me and in the Ia Drang Valley in November 1965, the results were considered to be positive, despite 234 US casualties in the latter battle, and the policy of attrition was endorsed.

Inevitably, there were civilian casualties as the "Cav" and ARVN forces attempted to drive the VC from villages they had occupied, and this did little to win over the local population in the "hearts and minds" campaign promoted by Washington. US Army helicopters were also heavily used to move local populations to "secure villages" – a policy which was later seen to be destructive to the villagers' morale and support for the US, as it obliterated their traditions and relationships with their ancestral territories. In too many cases helicopter gunships and ARVN infantry were used to clear and destroy villages that were suspected of housing communist sympathizers. More than 70 percent of settlements in Quang Nhai province were eliminated in this way during 1967. Local support for the corrupt Saigon government was evaporating fast.

For the VC, access to American weapons, often stolen from retreating ARVN forces, enabled them to equip sizeable guerrilla units. Local villages supplied provisions, willingly or otherwise. By early 1963, the Saigon Civil Guard, the Self-defense Corps, and many local units sponsored by the CIA had received more than 130,000 US weapons, including heavy machine guns. Many of these were acquired by the VC after they easily overran military outposts in South Vietnam, and they provided formidable opposition to local US helicopter operations. Heavier anti-aircraft weapons were not so easily acquired, however, and Hanoi undertook to supply 12.7mm machine guns, 37mm guns, mortars, and RPGs.

The VC insurgency was increasingly supported by NVA regiments under the command of Brig Gen Chu Huy Man, who planned to take both Kontum and Pleiku

provinces so as to effectively divide South Vietnam in two. The 1st Cavalry Division's success in frustrating that attempt persuaded Gen Westmoreland to give the unit a more active offensive role in locating and attacking enemy forces in its Kontum, Pleiku, and Binh Dinh areas of responsibility. In a strategic situation where the US had to concentrate mainly on supporting the ARVN in containing and frustrating Hanoi's attempts to undermine South Vietnam's defenses and political leadership, airmobile forces rapidly became ideal ways of cutting off, containing, and breaking up enemy attacks on towns and military strongpoints.

Expanding the airmobile force initially posed recruitment problems. The existing personnel of the 1st Cavalry Division tended to stay within the unit, and there was little relevant airmobile expertise to draw on from elsewhere in the US Army. In the long-running political interservice feuds of the day, the USAF won the close air support and logistics supply roles that the US Army had hoped to take over, using its airmobile divisions with integral fixed-wing components. USAF opposition to the US Army's airborne aspirations led to a December 1962 ruling that gunships should limit their suppressive fire to one minute before and after an assault landing. The US Army's fixed-wing aviation included very useful CV-2 Caribous, used as both light transport and radio relay aircraft, and OV-1 Mohawks for armed reconnaissance.

A compromise was finally reached in 1966 when the US Army agreed to surrender its Caribous and Mohawks from January 1967 in exchange for its own unlimited gunship close support assets. The 1st Cavalry Division was also allowed a few O-1 Bird Dog forward air control (FAC) aircraft. Helicopters, therefore, became the US Army's universal aviation components. In practice, USAF close air support was often required as well.

The policy of supporting forward bases to monitor NVA movements created refueling requirements on the primitive forward airstrips that UH-1s often had to use. Fuel tankers made the road journey from the port of Qui Nhon to the main helicopter bases at An Khe and Pleiku, although they were vulnerable to road-side attacks along Route 19 by VC guerrillas – several were lost to RPG fire. Fuel was then transferred to 500-gallon rubber "blivets" and slung beneath some of the 1st Cavalry Division 50 CH-47 Chinooks. The bigger CH-54 Tarhe, of which the US Army had six in-theater in 1965, could carry four bladders – twice the load of a Chinook at the higher base altitudes at which ground operations were usually conducted.

At the forward base the fuel was pumped into UH-1s with their engines running ("hot refueling"), but with electrical switches off where possible and a static grounding wire in place, using lightweight Kenco pumps. "Hot refueling" saved time partly because an engine needed to cool down after it was switched off,

Mud or dust were the natural Vietnam environments for gunships. ARA rocket-equipped 173rd AHC "Robinhoods" UH-1Cs are seen here on the ground with 1/4th Cavalry troops along Highway 13 between Lai Khe and Chou Thanh in a night defensive position in November 1967. (VAS047982 Philip Varsel collection, Vietnam Center and archive, Texas Tech University)

otherwise the exhaust gas temperature would exceed limits if it was re-started too soon. Refueling, and rearming door guns for a UH-1D, could be completed inside five minutes. The daily fuel requirement was between 40,000 and 75,000 gallons. Until 1967, Caribou light transport aircraft could also be used to import fuel where short runways were available.

Artillery was a basic component in the US strategy throughout the war, both from the extensive US Army resources and from US Navy vessels like the battleship USS *New Jersey* (BB-62), which could fire 16in. shells with considerable accuracy from a position ten miles offshore. Helicopter pilots, invariably operating at relatively low altitudes, had to make sure that they were well informed about artillery trajectories and targets.

Above all, the highly motivated NVA continually proved that the US policy of attrition and deterrence would not work. When airborne forces drove them out of their fortified positions, causing heavy casualties, those positions were often quickly abandoned by ARVN or US troops as being of little use, and they were then re-taken by the enemy. To the troops on the ground, US policy always seemed to be reactive – waiting for the enemy to attack, rather than hitting his source of munitions and materiel in North Vietnam and the DMZ.

Enormous quantities of supplies were indeed destroyed in attacks on enemy storage areas on both sides of the DMZ, but they were quickly replaced by China and the Soviet Union. VC supplies arrived in Chinese ships in the neutral Cambodian port of Sihanoukville. Prince Norodom Sihanouk, Cambodia's leader, who was adept at favoring both the Americans and the North Vietnamese, took Chinese bribes and used a truck company owned by one of his wives to transport the weapons to VC bunkers in eastern Cambodia.

Despite punitive casualty levels, the flow of NVA and VC troops from North Vietnam, Cambodia, and Laos seemed endless, and by 1969 US troops were increasingly uncertain that their own sacrifices were achieving much in the long term. In many respects, they saw that their main purpose had become survival and enabling their fellow soldiers to stay alive.

XM3-equipped UH-1B 62-2206 of Battery C, 2nd Battalion, 20th Artillery of the 1st Cavalry Division (Airmobile) at An Khe in 1968. As an alternative armament fit to the XM3, the UTTHCO experimented with a UH-1B loaded with four 19-shot XM159 pods, firing a devastating barrage equivalent to 76 artillery shells. It was too heavy a load for effective use in Vietnam, however. (Terry Panopalis collection)

THE COMBATANTS

HUEY AIRCREW TRAINING

Many US Army pilots volunteered for combat simply because they wanted to fly the UH-1. After training, they entered transport or gunship platoons – referred to simply as "slicks" or "guns." Most would complete at least two combat tours. Flight training was preceded by grueling infantry instruction at Fort Dix, New Jersey, and Fort Polk, Louisiana, where recruits, predominantly volunteers, learned through Basic Combat Training that they were primarily soldiers, with a secondary role as helicopter crew members. Trainees (known as "candidates") then commenced the nine-month-long US Army Primary Helicopter School course at Fort Wolters, Texas, where they endured some extremely robust "Preflight" training as potential warrant officers.

Warrant Officer Candidates (WOCs) then progressed to Fort Rucker, Alabama, or, from 1967, Hunter Army Airfield at Fort Stewart, Georgia, for advanced flight training and instrument flight instruction. For the latter, a specially equipped H-13 had optional blanked-out external vision. Small, two-seat TH-55 Osages were also used.

Alfred S. DeMailo, later with the 229th Assault Helicopter Battalion (AHB) at Pleiku, recalled one student who, flush with success after his first solo, decided to see what it was like in the empty instructor's seat, but knew he would have to change back to land. "Instead of landing and changing seats he tried to do it in mid-air. Those trainers were so small you could lean in them to make the thing turn. As soon as he stepped from the left side to the right, the aircraft tipped. He was not strapped in. He fell right through the rotor blades. That knocked the rotor blades off and the TH-55 went in."

UH-1B "Heavy Hog" trainer 63-8729, with the XM5 40mm grenade launcher (tested at Springfield Armory in 1962) and XM3 rocket packs. It has the original Gloss Olive Drab scheme used by both the UTTHCO and 57th Medical Detachment HU-1As in Vietnam in 1962. (US Army Aviation Museum)

Successful candidates then progressed to the Contact Phase at Knox Army Heliport, Fort Rucker, for specific training on the UH-1B, C, and D, followed by the Tactics Phase at nearby Lowe Army Helioport, which prepared them for realistic combat conditions. Al DeMailo explained, "We were expected to perform simulated missions like we were in Vietnam. They gave us classes on what altitudes to fly to avoid certain types of enemy fire – small arms or '0.51-cal'. They explained the trajectory of the weapons fired from an aircraft, especially when firing in a turn."

Fort Rucker trained 120 aviators on its gunship aerial weapons course for the UH-1B in 1965. By 1967, 600 pilots were being graduated per month. Although many of them had experience of fixed-wing aircraft, very different challenges lay ahead when it came to learning the sophisticated, coordinated control techniques required for rotary wing flying. Helicopters needed far more hands-on piloting than fixed-wing types. Candidates later tackled the difficult arts of landing in small areas, night, and instrument flying – crucial skills for their operational work in Southeast Asia. Fast "Contour flying" as close to the ground as possible to avoid ground fire was also mastered. Even more demanding was formation flying at night, with navigation lights off, using the glow from the leader's cockpit instruments for station keeping. In action, gunships sometimes left their lights on for night missions, for according to Al DeMailo, 'We had a doctrine that we'd rather have the enemy shoot at the gunship than at the lesser-armed 'slicks'."

In Vietnam, pilots frequently encountered fog and monsoon rain, which severely tested their "blind flying" skills. In UH-1C "gunnies," a pilot had to master taking off

with a 1,000lb overload, persuade the aircraft to hover at an altitude of just three feet, and then dip the nose slightly to achieve forward movement – basically skidding and bouncing along the runway to develop enough speed and lift to rise higher. Occasionally, the gunner and crew chief had to exit temporarily to reduce the weight sufficiently for take-off.

As they entered a one-year combat tour, many pilots heard the ominous rumor that the average life expectancy of a US Army Aviator helicopter pilot in combat was only 19 minutes. From 1965, around 99 percent of each completed class of students were sent to Vietnam. Most were 19 or 20 years old, with a few experienced "old men" per platoon in their late twenties. There, the "new guys" learned how to apply their recently-found skills to combat situations. Refining close formation skills was an immediate requirement, as airborne assaults could involve a tight "gaggle" of up to 40 helicopters, including ten gunships. Tactics such as "pinnacle landing" on top of steep hills, slopes, and karst outcrops amid destabilizing downdraughts to deliver heavy supplies to US Army firebases and outposts while under enemy fire were also tackled.

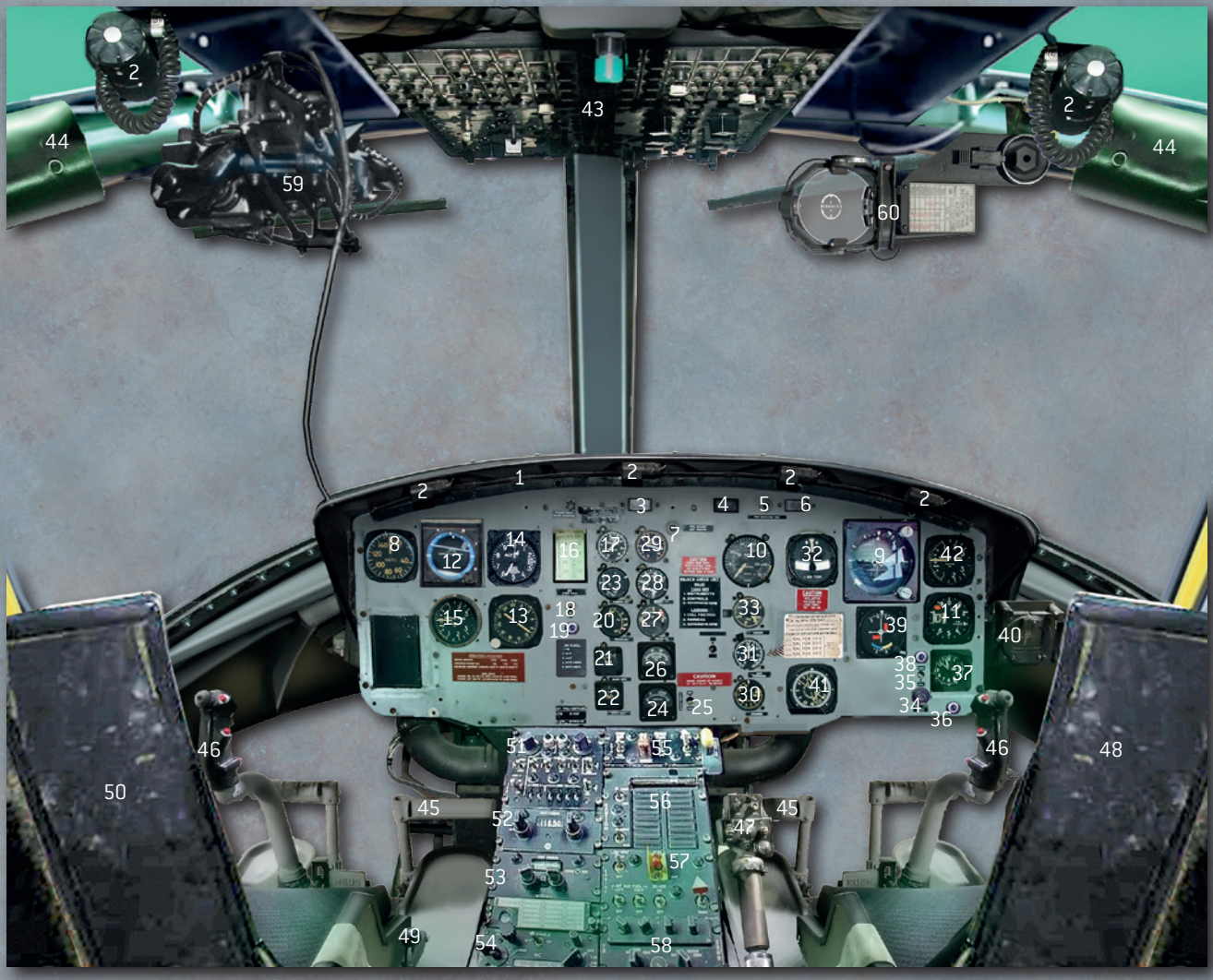
Experienced pilots with proven records of successful, aggressive combat could be invited to join a platoon in a fire team of one or two gunships operating with a scout helicopter and escorting "slick" assaults. As well as "prepping" an LZ ahead of the "slicks," gunship pilots could also warn crews flying troop carriers of threat areas, and advise them of enemy guns to avoid as they lifted out of the LZ. The VC knew the points in an assault where the helicopter was most vulnerable, so thorough "prepping" by gunships and strike aircraft was essential. Even then, there could be no guarantee that the "slicks" would be able to land and then depart without being targeted by enemy fire.

A platoon had around 45 men within an aviation company (airmobile) of 200 men, 23 "slicks," and eight UH-1C gunships, the latter usually being concentrated in the regiment's "D" Company. Four companies constituted a battalion, and typically four battalions made up a brigade. Aerial weapons companies usually had 12 gunships, and ARA-capable units had helicopters armed exclusively with rocket pods in order to cover a wider area than dedicated gunships. Battalion-sized air cavalry squadrons had three platoons. Later in the war, an aero weapons platoon ("Reds") operated 11 gunships, an aero scout platoon ("Whites") usually had the OH-6A LOACH (Light Observation Helicopter), and an aero rifle platoon ("Blues") flew a lift section of around five UH-1Ds. Where gunships operated with scouts, the team was coded "Pink." Other Hueys were assigned to four air ambulance platoons.

Recognizing the demands of helicopter flying, with its noise and vibration, the US Army initially limited pilots to four hours of "stick time" per day, but this rule was

A pilot uses the XM60 reflex sighting system for the M75 grenade launcher from the left seat of a UH-1C gunship. Many pilots preferred to sight their rockets with a grease-pencil "X" mark on the windshield, rather than using the somewhat cumbersome XM60 sight. Some gunship pilots also opted to aim their miniguns in the same, somewhat crude, way. Red tracers were then used to correct their aim. (US Army Aviation Museum)

UH-1C HUEY COCKPIT



1. Glareshield
2. Cockpit lighting
3. Master caution light
4. RPM warning light
5. Fire detector test switch
6. Fire warning indicator light
7. Fuel gauge test switch
8. Airspeed indicator
9. Altitude indicator
10. Dual tachometer
11. Altimeter indicator (AAU-31/A)
12. Altitude indicator
13. Radio compass indicator
14. Altimeter indicator (AAU-32/A)
15. Vertical velocity indicator
16. Compass correction card holder
17. Fuel pressure indicator
18. IFF hold switch
19. IFF code hold light
20. Transmission oil pressure indicator
21. Main generator load meter
22. Standby generator load meter
23. Engine oil pressure indicator
24. AC voltmeter
25. Compass slaving switch
26. DC voltmeter
27. Transmission oil temperature indicator
28. Engine oil temperature indicator
29. Fuel quantity indicator
30. Exhaust gas temperature
31. Gas producer tachometer indicator
32. Turn-and-slip indicator
33. Torque meter indicator
34. Marker beacon volume control
35. Marker beacon sensing switch
36. Cargo release armed light
37. Clock
38. Marker beacon light
39. Course deviation indicator
40. Magnetic compass
41. Radio compass indicator
42. Vertical velocity indicator
43. Overhead console
44. Windshield wiper motors
45. Rudder pedals
46. Cyclic sticks
47. Collective lever
48. Pilot's seat
49. Shoulder harness lock
50. Co-pilot's seat
51. AN/APX-72 transponder
52. AN/ARN-82 VHF NAV radio
53. AN/ARN-134 VHF COMM radio
54. AN/ARC-51BX UHF radio
55. Auxiliary controls
56. Caution light panel
57. Engine control panel
58. AN/ARC-131 FM radio
59. XM6 sighting station
60. XM60 reflex sight

often broken as enemy activity increased. After around 200 hours of combat flying, a pilot could qualify as an aircraft commander, with possible promotion to platoon commander.

The co-pilot had responsibility for the three radios (UHF, VHF, and FM). If a helicopter was brought down in "bad guy country," a priority for the crew was to destroy the radios and KY-28 scrambler to prevent them from being captured and used to monitor US Army communications. At the massive Camp Holloway helicopter base near Pleiku, where nocturnal attacks by sappers and VC rockets were very frequent, a flare-carrying UH-1H was always on alert (despite the slow spool-up time to operational 6,600 rpm for its engine). Its job was to try to illuminate the enemy firing positions so that a helicopter gunship could destroy them before the VC could escape.

USAF AC-47 and AC-119 gunships could provide coverage around base perimeters, but a quick response from a UH-1 gunship team gave the most immediate solution. Mortars could be particularly ruinous. The 188th AHC at Camp Rainier, in Binh Duong Province, was rendered non-operational within minutes on June 24, 1967 when 100 mortar rounds were fired into the base, disabling 29 of its 31 helicopters.

VC sappers sometimes found ways to penetrate the bases' extensive defense lines of troops and landmines. They then planted satchel charges to destroy helicopters or dropped hand grenades into their fuel tanks. The grenades' detonating handles were held down with rubber bands that would decay when immersed in fuel and explode the weapon, possibly when the helicopter was airborne.

Crew chiefs, usually "specialist 5s" with similar rank to a sergeant and selected for light body weight, doubled as door gunners. They were responsible for the gunship's overall maintenance, in flight and on the ground. Except when manning his gun, the crew chief sat near the pilot to help monitor the gauges, and in a few cases saved a helicopter by replacing a wounded pilot. His maintenance tasks often continued long after each flight, and included cleaning it out after a mission.

A crew chief installs new barrels on the M60C "flex guns" of the XM16 system on its XM156 multi-armament mount. An MA4A bomb rack for rocket tubes hangs below the mount. (US Army Aviation Museum)

Maintaining heavily utilized UH-1s in Vietnam involved challenging conditions to achieve 70 percent availability. Periodic inspections at 100 hours, combat damage, and replacing rotor blades at unusually short intervals due to wear from heavy loads, sand, and tree damage all reduced availability. Filters for engines, that were constantly over-worked in the humid conditions at high temperatures and altitudes, became clogged with dust. Vibration in normal flight wore parts out quickly. Rotor blades often had to be "tracked" to ensure

that they were adjusted to move in the same path. Deeper maintenance or repair could be provided at Tan Son Nhut's 34th General Support Group (Aviation Support), routinely by contracted civilian technicians.

A gunner took the other door gun and the responsibility for all the fixed and flexible armament, including loading rockets. Cleaning, lubricating, and loading the miniguns, "flex guns" or door-mounted M60s was required. Barrels on the door guns had to be changed when their gas pistons became clogged with carbon deposits, and jams required clearing. Up to four spare barrels with flash suppressors were usually carried.

In combat, "slicks" tended to fly right-hand clockwise patterns over LZs so that the gunner in the right door did most of the shooting. In gunships, with the aircraft commander in the left seat, the opposite pattern was flown so the crew chief was more often the shooter. Both had to ensure that they did not hit the rotors. The stream of hot cartridge cases ejected from their guns had to be directed away from the two pilots, who kept their collars turned up to stop cases going down their necks. After a mission, the floor would be deep in brass cases, which could not be jettisoned in case they damaged the tail rotor. Gunners also had to ensure that they did not hit any rockets launched from the gunship and explode them ahead of the helicopter. Pilots shouted "Coming hot" to warn of an imminent launch. At that point, the rockets' igniter caps would blow back into the cabin area, usually hitting the gunners' legs.

OTHER HUEY COMBATANTS IN VIETNAM

US NAVY

In September 1966 one of the US Navy's HC-1 detachments, based at Vung Tau and nicknamed the "Seawolves," used two (of eight) US Army UH-1B gunships in the Mekong Delta in support of *Game Warden* Task Force 116. The helicopters provided gunship protection for gunboats patrolling rivers and canals. Operations began on October 31 when 50 troop-carrying sampans were destroyed. In November four modified tank landing ships were received, each with provision for two UH-1Bs and their fuel and ammunition.

The Vung Tau-based unit became Helicopter Attack Squadron (Light) (HA(L)), in four detachments, in April 1967 as it attained full squadron strength with some ex-1st Cavalry Division UH-1Bs. It would subsequently operate up to 33 gunships during five years of service through to January 1972. Some UH-1Cs were also acquired in 1969–70, and operations on the Cambodian border were conducted to intercept NVA supply lines. HA(L)-3 UH-1Bs had XM16 or XM21 systems and twin 0.30-cal. door guns, with a number of gunships also being fitted with "Firefly" target illuminators. Experiments were also conducted with CBU-55 fuel/air explosive bombs, mounted on rocket stations.

"Seawolf" UH-1Bs flew medevac sorties too, and extracted threatened troops on many occasions, particularly during the Tet Offensive. For night patrols, a UH-1B flew with its navigation lights on to try and draw enemy fire. The attackers would then be engaged by a second, blacked out, UH-1B following behind at higher altitude. The UH-1Bs were replaced by UH-1Ms in 1970.

Two ex-US Army UH-1B gunships used by HA(L)-3 "Seawolves" patrol over the Rung Sat Special Zone in the Mekong Delta on May 3, 1967. (VA049375 US Navy/ Charles E. Rogers collection, Vietnam Center and Archive, Texas Tech University)

US MARINE CORPS

The US Marine Corps had ordered 100 UH-1Es by February 1964, with the first example (BuNo 151266) being delivered to its tactical squadron VMO-1. After the Gulf of Tonkin Incident some six months later, the helicopters were seen principally as gunship escorts to replace UH-34s. Marine Air Group 36 arrived in-theater on board USS *Princeton* (LPH-5) on 11 August 1965 with VMO-6 (27 UH-1Es), UH-34s, and H-37 heavy lift helicopters, which were duly based at Ky Ha near Chu Lai – VMO-6 had received its first UH-1Es in 1964.

The Hueys took part in numerous engagements in support of Marine ground troops, commencing with Operation *Starlite* on August 18, 1965, which was intended to frustrate a large 1st VC Regiment attack on Chu Lai air base. It saw the US Marine Corps' first large-scale use of helicopters to move troops. Other key campaigns included Operations *Blue Marlin* (November 1965) and *Double Eagle* (January–February 1966), the Battle of Hill 488 (June 15–16, 1966), when the squadron lost its commanding officer, Maj William Goodsell, to ground fire, and the Battle of Khe Sanh (January–July 1968).

US Marine Corps gunship operations tended to be flown at altitudes above 1,200ft. UH-1Es had the TK-2 system comprising twin M60C machine guns and racks for seven-shot 2.75in. rocket pods. Later armament options included two 0.50-cal. SM14 machine guns or an Emerson TAT-101 turret with two M60 guns.

On May 3, 1965, VMO-2 took six UH-1Es to Da Nang to escort US Army H-34 troop carriers. In August the VMO units moved to a new base at Marble Mountain near Da Nang. No fewer than 13 VMO-2 UH-1Es were lost in a VC attack on Marble Mountain on the night of October 27–28, 1965. VMO-3 and VMO-5 were formed

in 1966 with replacement UH-1Es and some borrowed US Army UH-1Bs. VMO-2 received OV-10A Bronco armed FAC aircraft in August 1968, operating them alongside its AH-1G Cobras and eight UH-1Es.

Two months earlier, on June 8, 1968, VMO-6 had conducted a spectacular nocturnal tactical extraction escort mission for 600 Marines with six CH-46 troop carriers. As fixed-wing aircraft were unavailable for CAS, two UH-1Es held the enemy at bay with suppressive fire. Another pair expended their ordnance on a Khe Sanh target on June 25, encountering heavy AAA. They re-armed and returned with a pair of VMA-223 A-4Cs to finish off the target. One Skyhawk was shot down by "0.51-cal." fire, its pilot, Capt Charles Coltrin, being recovered by a gunship.

Like the US Army, the US Marine Corps experienced helicopter pilot shortages, so it retrained up to 500 fixed-wing pilots. In 1967 the accelerated training program produced 100 new helicopter pilots annually and facilitated the replacement of H-19 Chickasaw helicopters with UH-1s.

USAF UNITS

The 20th Helicopter Squadron based at Nha Trang received 14 UH-1Fs in January 1967. They were the USAF's only helicopter gunships at the time, and from February they flew covert missions in support of MACV's Studies and Observations Group, which inserted troop patrols into locations via 120ft-long rope ladders for observation and sabotage of enemy movements on the Ho Chi Minh Trail. On November 26, 1965, 1Lt James Fleming was awarded the Medal of Honor for rescuing a seven-man team under heavy VC fire that claimed one of his gunship escorts.

Four UH-1Fs initially provided armed escort for troop-carrying CH-3 helicopters in Laos and Vietnam. Inter-service rivalry intervened, however, with the US Army taking exception to the missions. They were duly suspended. Some UH-1Fs were fitted with spray-bars to clear vegetation from around Lima Site 36 in Laos, denying the enemy any camouflage for covert attacks on the secret radar base. They also laid down smokescreens to disguise troop advances, used banks of searchlights to seek out enemy forces at night, and dropped napalm canisters. No fewer than 19 of the 20 UH-1Fs modified into gunships were lost in Vietnam.

UH-1H A2-773 of the RAAF's No. 9 Sqn, based at Vung Tau, engages an enemy position with minigun fire while the door gunner finds another target for his twin M60s. Black RAAF titling and a kangaroo in silhouette are dimly visible on the olive drab tail boom. (Brian Leslie John Dirou, courtesy of AWM P01960.001)

RAAF

In March 1966, No. 9 Sqn's UH-1Bs were sent to Vung Tau air base, followed by four "Bushranger" UH-1Ds armed with rocket pods, miniguns, and twin M60s – the latter were also used by UH-1Bs for suppressive fire. The gunships provided close support for Australian ground troops, including "people sniffer" (olfactory reconnaissance) missions. They remained in action until November 1971, flying 223,487 operational sorties. During that time the unit lost only five helicopters, and claimed 431 enemy deaths with its UH-1D. Some Royal New Zealand Army and Air Force pilots were also attached to No. 9 Sqn, and six received

the Distinguished Flying Cross for their actions. The Royal Australian Navy Helicopter Flight, equipped with UH-1C/Hs, arrived at Tan Son Nhut in October 1967 to integrate with the US Army's 135th AHC at Vung Tao.

RVNAF

In 1968–69, five RVNAF helicopter units converted from the H-34 Choctaw to the Huey, four of them receiving UH-1Hs for combat assaults, mainly in the Mekong Delta. Although 700 H-34s had been transferred to the RVNAF from US Army stocks, a lack of spare parts seriously reduced their availability to around 300. Training intensified at this time, partly to reduce the operational loss rate, which was running at 22 aircraft of all types per month. Most of these losses were suffered during take-offs and landings.

By the summer of 1972 there were 16 UH-1 units, including four squadrons at Da Nang, with others at the bases previously used by US Army units. The 217th Helicopter Squadron at Binh Thuy had gunships, as did other units, but the lack of USAF tactical jets and B-52s in-theater reduced the RVNAF's capability for US Army-style search and destroy or troop insertion operations. By the end of 1973 the RVNAF had lost 91 UH-1s, including most of the UH-1B TOWs that had been passed on to it by the US Army.

During the evacuation of Saigon (codenamed Operation *Frequent Wind*) on April 29–30, 1975, a number of Hueys laden down with escaping RVNAF personnel and their families landed on board US naval vessels sailing off the coast of South Vietnam and were then pushed over the side once vacated to make room for more to land.

VC AND NVA FORCES AND TACTICS

The fragility of helicopters and their unavoidable exposure to enemy fire were well understood prior to their large-scale commitment to battle in Southeast Asia, and US forces expected heavy losses as a result. During the 36 million sorties flown in ten years of war, the VC and NVA succeeded in hitting 22,000 helicopters, often causing only slight damage.

North Vietnamese resistance to the helicopter actions began in 1962 when, on October 5, the 1st Company of the 514th My Tho Provincial Battalion took on ARVN Rangers around Chau Thanh District and claimed three helicopters shot down. Shortly thereafter, while resisting a landing in Ca Mau, VC guerrilla Nguyen Viet Khai was credited with destroying three helicopters with rifle fire. Another heroic action during this period saw Doan Van Manh fight back with his submachine gun after apparently being "cornered by an enemy helicopter." The latter was driven away.

The VC's initial fear of the "dragon" helicopters and hesitation in the face of airborne assaults was soon replaced by tactics that required the concentrated employment of infantry small-arms and skilful use of the terrain to prepare effective ambushes. Senior officers studied gunship operations in 1963 and convinced their

Would-be gunners are trained to operate the DShKM 1938/46 12.7mm weapon. Hanoi saw the Battle of Plei Me as proof that the effective employment of such heavy machine guns by the NVA could "disrupt the helicopter assault tactics and defeat the most elite units of the American Army even under the most difficult conditions." US Army statistics included only two helicopter losses at Plei Me, however. (Dr. István Toperczer collection)

apprehensive troops that reinforced bunkers and foxholes, together with camouflage, would enable them to overcome this new threat. Much of the heavier weaponry was smuggled in from China and North Vietnam in trawlers to secret locations along the South Vietnamese coast. Large stockpiles were hidden in South Vietnam for use after weapons training for local militia had been organized.

In 1965 a large area of the Bong Son Plain in South Vietnam had been well prepared by the NVA's 3rd Division to resist airborne landings. Open spaces that could become LZs were surrounded by rows of bunkers and camouflaged foxholes that enabled coordinated fields of fire from all sides. Foxholes in irrigation dykes were reinforced with wood and metal supports to resist the gunships' bullets. Deep shelters were provided to protect gunners from air strikes, while communication trenches enabled a rapid supply of ammunition and medical support. If their locations were spotted by gunship pilots, they would withdraw and set up their weapons in different foxholes.

By 1971, North Vietnam's self-defense forces had two million members, including 870,000 guerrilla troops. They controlled 50,000 infantry weapons, 1,400 anti-aircraft guns, and 800 mortars and recoilless rifles. AAA battalions were organized within large factories for self-defense using 37mm guns. Local militia in smaller towns and villages usually had 12.7mm and 14.5mm machine guns as primary AAA weapons. During the Ia Drang battles it was noticed that the 12.7mm positions were arranged in triangles one kilometre apart. Some militia units nearer coastal areas had 85mm guns.

By November 1972, the inventory had expanded again with 3,090 guns of all types including 1,305 medium machine guns, 1,076 12.7mm machine guns, 424 14.5mm machine guns, and 17 20mm cannon. Eighty-two 85mm and 70 100mm AAA weapons were added to the 37mm batteries.

In late 1972, for the defense of North Vietnam from renewed American attack, Hanoi listed 350 direct combat teams among its self-defense forces, with 100 AAA weapons. They operated guns of 100mm, 85mm, 57mm, 37mm, and 20mm caliber, supported by 550 12.7mm and 14.5mm anti-aircraft machine guns and 700 of smaller caliber. The nation's SAM capability within the 361st Air Defense Division ran to a total of eight missile regiments. Many of these AAA and SA-2 units were positioned in northeastern areas of the Ho Chi Minh Trail, within the DMZ and within South Vietnam for much of the 1971–72 period, where they presented an increasing threat to US and RVNAF helicopter operations.

For US helicopter crews, up to 1969–70 the primary threats at their operational altitudes of 50 to 1,500ft (known as the "zap zone") were still machine guns and automatic weapons, with smaller numbers of 23mm and 37mm weapons at some LZs. Pilots attempted to fly to target areas at 3,000ft, but they were usually far lower when

engaging enemy forces. Flying at 100ft over jungle gave enemy gunners little warning, and a fleeting target. Automatic fire from Kalashnikov AK-47s or similar weapons was usually only visible by their muzzle flashes and smoke, but the ubiquitous DShKM 1938/46 "Dushka" 12.7mm heavy machine gun projected bright red-orange tracers "as big as baseballs." Tracers were loaded alternately with high explosive rounds, and a hit from a tracer in a UH-1's fuel tank could destroy it. "Dushkas" could reach up to 3,000ft – well within the helicopters' operational envelope.

The Chinese Type 67 machine gun fired smaller 7.62mm (0.30in.) ammunition, but it too could reach a height of more than 2,000ft. However, it was most effective below 1,500ft. Rocket-propelled anti-tank grenades such as RPG-2s – a standard weapon for insurgent forces for decades – were primitive and fairly inaccurate weapons, but a single hit could cause terminal damage to a gunship. At close quarters, a hit in the transmission area would immediately throw the aircraft out of control. Enemy gunners also knew that UH-1B/C gunships had to fly in a steady, shallow dive to aim their rockets and fixed guns, making them easier targets for machine guns.

Sometimes, higher attrition of the helicopter force could be achieved by attacking their bases. Camp Holloway was a frequent target for mortars and 122mm rockets, which destroyed numerous helicopters and their supporting equipment. In 1968, the main ammunition dump at the base was hit by a 122mm rocket, causing some of the most spectacular and prolonged explosions of the entire war. A VC officer who was killed in a sapper attack had in his possession a detailed sketch-map provided by spies on the base that showed the locations of each helicopter and soft target.

Disruption through frequent night attacks or sapper invasions was damaging, as helicopter crews had to revert to their infantry roles and defend their bases with rifles, rather than catching up on much-needed sleep. The attack on Bien Hoa air base during the Tet Offensive in January 1968 caused considerable destruction, although UH-1Cs fired into groups of VC sappers, preventing them from reaching the hangars containing fixed-wing aircraft.

The VC quickly learned to set up machine gun positions on either side of potential LZs, with a third gun position facing the helicopters as they landed. Their first success came when troops of the 1st Company, 514th Regional Battalion shot down two H-21s (dubbled "angleworms" by the VC) near Tan Thoi in January 1963. The guns were set up in deep trenches behind a line of undergrowth or trees that rendered the defenders fairly safe from anything except a direct hit from above or asphyxiation by napalm.

For machine gun positions, troops dug a foxhole that was wide enough for a gunner and loader to stand in. The

Recruits often received basic weapons training within local militia groups prior to moving to VC or NVA units. A miscellany of former French, Japanese, or Chinese rifles provided the training tools, requiring more than a dozen different types of ammunition. (Dr. István Toperczer collection)

surrounding undergrowth was undisturbed, and supplemented by branches so that the position was invisible even to a low-flying observation aircraft. Irrigation ditches were used for the resupply of ammunition and for communication. Complex timber and earth bunkers and foxholes had been dug into the hills around the US Marine Corps Combat Base at Khe Sanh by April 1967. When the Marines took nearby Hill 861, they found 400 foxholes, 25 bunkers, and numerous mortar pits, all elaborately camouflaged and relatively immune from gunship attack. The taking of Hill 881 revealed a further 250 bunkers, most of them resistant to anything but a direct hit by a 500lb bomb – a tough task for a supersonic fighter-bomber. Gunships' machine gun fire was often ineffective, and rockets lacked the accuracy to penetrate their firing ports.

VC battalions had observed that after the gunships had established their "pre-strike" orbits, firing at any perceived threats around the LZ, the "slicks" had to land facing a gun position ahead of them. The helicopter crews could not directly return fire, as they only had door-mounted machine guns and lacked forward-firing armament. "Slick" pilots would approach slowly, hover briefly, and then land in order to deposit their troops, before getting airborne within seconds and trying to make small evasive maneuvers as they pulled away from the LZ. In forest LZs, where helicopters had to descend through tall trees to drop off their troops, the North Vietnamese held their fire until the Huey was about to touch down, knowing that it would have insufficient power to climb away until its passengers had exited.

In that situation, a "slick" pilot could rely on gunships to fire rockets and miniguns into the enemy positions as close as possible to the trapped transport. Gunship crews were particularly anxious about possibly hitting US troops as their rockets were not very accurate. A 600ft no-fire area was duly observed ahead of friendly troops, whereas gunfire could be directed within 300ft of them. Troops indicated their positions with smoke grenades of pre-determined colors.

After close study of airborne tactics, the VC devised many crude but effective defensive ruses, using local natural resources. Catapults, triggered by a helicopter breaking a string across the LZ, fired timber "arrows" at the aircraft as they landed. Given sufficient warning (usually available through an extensive spy network), guerrilla troops could seed an LZ with anti-personnel mines and improvised explosive devices. A 135th AHC UH-1H was blown up by a landmine as it touched down on 6 March 1968, although UH-1Cs then killed 30 VC in response. Troops also attached wires between trees to catch the tail rotor of a maneuvering helicopter.

VC troops received instructional leaflets showing them how to allow "lead" in firing at oncoming helicopters. They only had to fire a short distance (about two-thirds of the fuselage length) ahead of a slow H-21 as it approached for landing, while UH-1 Hueys (christened "dippers" by the VC) required longer lead distances. At VC training camps, cut-out models of various helicopter types were moved along string rails at appropriate speeds to calculate lead correctly and save ammunition. Machine gunners received the most intensive training.

All gunners were instructed to hold their fire until assault helicopters were at their most vulnerable. Massed fire from unexpected quarters would then have the maximum destructive effect. The machine gunners were particularly focused on UH-1 gunships, massing their crossfire against one as soon as it lined up for a rocket or gun attack. Gunners in well-established foxholes knew that if they kept their heads down they

were relatively safe from the gunships' small-caliber machine guns. Gunship pilots only had the tracer patterns from enemy positions to give an idea of their locations.

The VC became more adept at initiating action during 1966, ambushing American units and drawing them into situations where US commanders had little idea of the strength and location of the enemy's defenses. In 56 defined conflicts that year, the VC/NVA started the shooting in 85 percent of the engagements, often drawing airborne forces into heavily defended LZs.

US troops were constantly impressed by the enemy's ingenuity in avoiding situations where they would be overwhelmed by superior US technology. However, there were reports of VC gunners surrounding themselves with civilian hostages to protect them from helicopter door gunners during reconnaissance missions. Sometimes, the VC infiltrated ARVN airborne platoons. After landing at an LZ, they turned and fired at their helicopter crew before escaping to join their comrades in the jungle, with some more US kit as booty.

During an armed assault, the gunship element tried to provide mutual support, although this was made more difficult because individual pilots would have to deal with their own targets of opportunity, rather than preserving formation discipline with others in the platoon. If sound LZs could not be established, helicopters could land in rice fields, knowing that the water would be shallow enough to allow them to take off again.

By 1969, the gunships' time on target was maximized by positioning Forward Arming and Refueling Points close to the fighting. Gunships could expend all their armament in a few minutes over a particularly "hot" LZ. Crews would then withdraw to refuel and rearm their helicopters themselves, using "hot refueling" to speed up the process.

UH-1C 66-15151, seen at Qui Nhon in May 1969, was a long-term survivor with the 134th AHC's "Devils" gunship platoon from November 1967 until it was lost on 11 January 1970, killing crew chief Ed Hamrick. The helicopter's popular nickname had its sinister message extended with the word "Pills" written on top of the 40mm grenade turret – the letter "P" is just visible on the cropped turret to the right. (US Army)

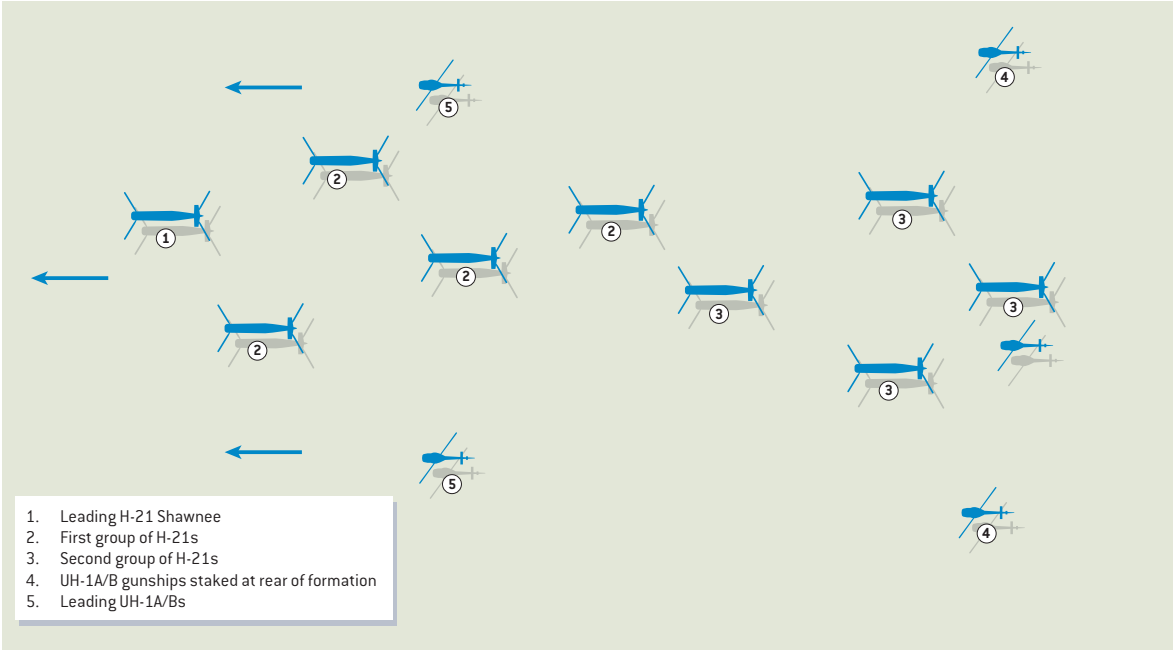
COMBAT

Although H-21 Shawnees initiated airmobile operations in Vietnam, more agile, heavily armed helicopters were needed to escort them into defended LZs. On January 25, 1962, the US Army's UTTHC was formed within the 53rd Aviation Detachment on Okinawa to support the 33rd, 57th, and 93rd Light Helicopter Companies in the III and IV Corps Tactical Zones in the southern part of South Vietnam. From April 1963 they also provided support for US Marine Corps HU-34 helicopters in the I Corps area.

The 15 UTTHC HU-1As were fitted with hand-held door guns, with forward-firing machine guns (0.30-cal. M37C or 7.62mm M60C) and 2.75in. rocket launchers attached to the landing skids. The unit, under Maj Robert Runckle, had arrived in Vietnam on October 9, 1962 and commenced escort duties for H-21s in Operation *Morning Star* ten days later.

The rules of engagement required the first combat operations to support the ARVN. Until February 1963, troops could only be inserted to deal with VC activity if the enemy fired first. By the time permissions had been received from South Vietnamese and American authorities, the VC had usually vanished. When battalion-sized troop landings were made, the increased VC opposition necessitated more gunships.

Eleven UH-1Bs duly arrived for the unit on November 20, 1962, the helicopters featuring the factory-installed XM6 armament system. After 1,779 hours of operational tests over South Vietnam, during which time only one UH-1 was badly damaged, the UTTHCO experiment was seen as proof by the Army Concept Team in Vietnam that armed helicopters could survive in combat environments. Despite constant increases in NVA firepower, which doubled the losses of unescorted helicopters by March 1963, their rate of loss was 25 percent less with gunship escort.


1. Leading H-21 Shawnee
2. First group of H-21s
3. Second group of H-21s
4. UH-1A/B gunships staked at rear of formation
5. Leading UH-1A/Bs

However, even faster gunships were needed to keep ahead of the assault force, despite their extra weight of armament.

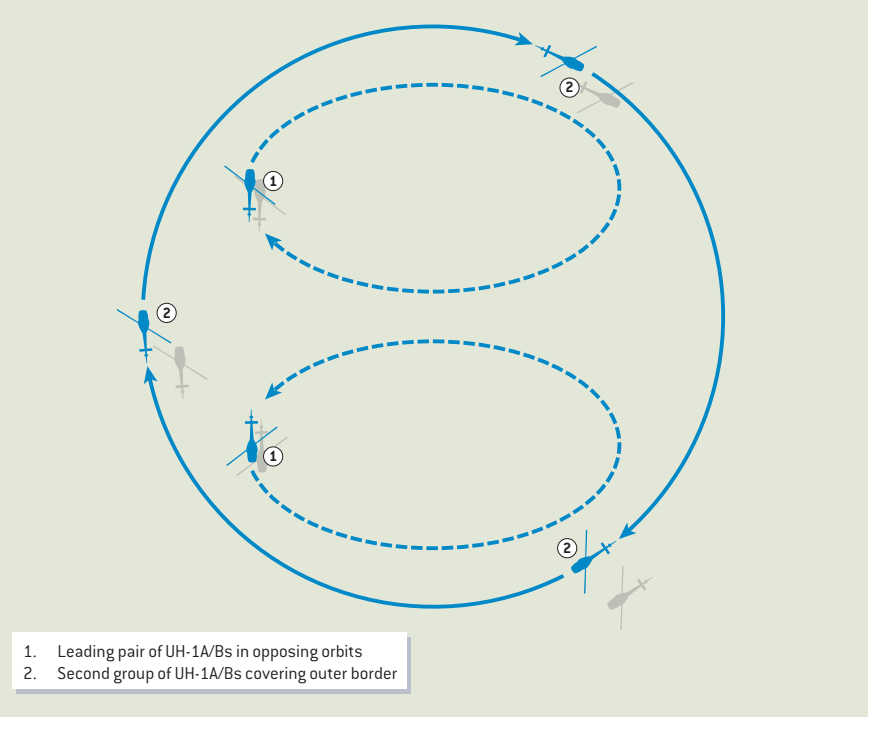
UTTHC gunship tactics evolved to include escort and reconnaissance, direct fire support and security. UH-1Bs protected "slicks" flying at a height of about 1,500ft (thus negating the effectiveness of small arms fire) en route to an LZ, before approaching the area of operations at low altitude. During troop embarkation at the LZ, they flew below 200ft to suppress ground fire with "direct fire support." "Security" involved protecting military bases and transport convoys. During this five-month operational test 1,779 sorties were flown and 11 gunships were hit, but none were lost. They were credited with inflicting 246 VC casualties with rockets and machine gun fire. Later, some platoons, including the 116th AHC's "Stingers" specialized in low-altitude attacks, while others preferred dive attacks to deliver rockets from higher altitudes.

By the end of 1964 further refinements allowed the lead "gun" to choose targets, relaying his instructions to the force. Targets were initially engaged at a gunship's maximum machine gun range, following up with rockets. A second gunship would follow closely to continue fire suppression, concentrating on known enemy positions and choosing the best attack angles, often at tree-top level. This onslaught sometimes caused unprepared defenders to withdraw. Later in the war, a "smokeship" was added – a particularly hazardous assignment. It flew a horseshoe pattern around the LZ perimeter at 80 knots at an altitude of less than 20ft, dispensing oil smoke through its engine exhaust to camouflage the landing infantrymen for about 30 seconds.

Once the troops were on the ground, the escort commander took instructions from the ground commander on additional targets, or from a command and control helicopter flying above the battlescene. As more gunships became available, four or five would "prep" the LZ ahead of the landing, while others flanked the formation and another pair followed it in to deal with any gunfire from below the "slicks."

Early airborne assaults in 1965 used up to ten H-21 Shawnees, escorted by five UH-1A/B Huey gunships, to carry ARVN troops to an LZ. The H-21s flew at between 1,500–2,000ft, depending on the length of their journey. A UH-1A/B flew either side of the leading formation, spaced about 1,000ft from the H-21s. As the formation neared the LZ, this pair flew ahead to set up orbits from which they could prepare the LZ by suppressing ground fire. Three more gunships were stacked above and to the rear of the formation, with the platoon leader in the highest UH-1 (about 600ft above and behind the H-21s) to command a good view of the LZ approach. About five miles from the LZ, a US Army O-1 Bird Dog FAC control aircraft, flown by the H-21 company's operations officer at 2,000–3,000ft, led the formation in.

The two leading UH-1s set up opposing elliptical orbits at an altitude of 50–75ft near the outer edges of the LZ in order to attack any gunners who targeted the H-21s or Huey "slicks." If the enemy opened fire, one UH-1 would climb to 500ft to launch its rockets without risking ricochet damage. The gunship then returned to the "daisy chain" pattern, allowing the UH-1s to keep the enemy under constant surveillance, and threat. The second group of UH-1s approached at 500ft and set up circular orbits around the whole LZ area so as to cover the H-21s during their 15 seconds on the ground unloading troops.



1. Leading pair of UH-1A/Bs in opposing orbits
2. Second group of UH-1A/Bs covering outer border

Gunships flew circular or "figure-of-eight" patterns over the LZ while the assault landings took place, ideally approaching and departing from different directions. The whole operation could take only two minutes. If three "guns" were provided, the third would fire off all its ammunition first and then return to rearm (a longer process for miniguns than for rockets), while the other two gunships managed the LZ. In many platoons, the lead gunship had only rockets.

Gunships often had to fire at close quarters to the "slicks," as Al DeMailo recalled. For his first big mission at An Lo, he was among 12 UH-1Cs and two ARA UH-1Bs escorting 24 "slicks" led by the battalion commander. His Instructor Pilot Ed Richter was "letting me fire the rockets while he used the miniguns from the left seat. I was punching off rockets and we were down real low, skimming the trees and shooting them along the sides of the 'slicks'." Noticing a building ahead, he decided to keep firing, even though the rocket would pass close to his CO's Huey. "I punched one more. I did hit the hooch, but it was just luck, and it blew up right next to the battalion commander's aircraft." Luckily there was no damage – or recrimination.

Premature detonation of rockets was an occasional hazard, resulting in similar damage to being hit by AAA, as the 336th AHC "Thunderbirds" reported on December 23, 1966 following an extraction near Ca Nau:

> The T-Bird team began receiving heavy automatic weapons fire. The T-Bird chief flying the "Hog" decided on a target attack on the treelines. There was a malfunction in one of the rockets on the left side. After leaving the tube, the rocket motor exploded, seriously wounding the crew chief and causing heavy structural damage to the left side of the aircraft.

On January 2, 1963, in a heavy engagement at Ap Bac, south of Saigon, following an attempt to destroy a VC radio transmitter, tactical air support had been considered unnecessary until four H-21s were lost within five minutes to well-coordinated ground fire from carefully prepared gun positions. The helicopter force had unwittingly touched down too close to the latter. An UTTHCO Huey was also shot down in a hover during repeated attacks on machine gun positions while attempting to rescue Shawnee crewmen. Fourteen of the 15 helicopters involved were hit.

When USAF strike aircraft arrived, the VC, with only 18 killed, had already slipped away in darkness due to the ARVN's failure to cut off their retreat. Another attempted landing by Shawnees at Ap Bac shortly thereafter was again met by VC, who had advanced along camouflaged irrigation canal banks to set an ambush. Six more Shawnees were destroyed, as were two M113 armored personnel carriers.

The steady build-up of US forces continued. In March 1963 the 52nd Combat Aviation Battalion arrived, followed by the 114th Aviation Company by 10 May with two "slick" platoons and one with eight UH-1B gunships. This pattern was followed by battalions converting from H-21s to Hueys by early 1964. Four massive twin-engined CH-47B Mojave helicopters arrived in May 1963. Mojaves in Vietnam recovered 139 aircraft, some from behind enemy lines, including 43 Hueys in 1963–65. UH-1 losses were appreciably reduced by airborne recovery throughout the war, as the comparatively simple airframe could be repaired. Numerous Hueys were shot down more than once.

Some hits were unexpectedly harmless. Brig Gen Stan Cherrie recalled one odd event. "When you're taking fire you hear a sound like knocking on wood. This time, 'Bam' [followed by a crewman's comment], 'Sir, I think we just took a 0.50.' All of a sudden I get this very pungent smell [like JP4 or hydraulic fluid]." In fact, a bullet had entered behind the pilot's seat and destroyed a bottle of tabasco sauce in the storage area, before exiting through the roof.

Emergency troop extractions of small long-range reconnaissance patrols could be achieved via a rope ladder from a hovering Huey. It then left the threat area with the troops clinging to the rungs and sometimes firing weapons. Usually, a UH-1B/C gunship was inconspicuously nearby to add supporting fire. Troops at isolated firebases sometimes requested the presence of a gunship if they suspected an imminent enemy attack. The UH-1C crew then took up temporary residence.

The build-up of VC in 1964 advanced rapidly, with 56,000 fighters in place by December and a further 40,000 available in back-up roles. Frontline troops comprised 73 regiments, each with around 700 men, including seven battalions with heavy weapons and AAA. Their successes against ARVN actions began to increase. On December 9, 1964, an ARVN armored company was ambushed by two newly formed VC battalions only 40 miles from Saigon. Its 14 M113s were destroyed by 57mm and

A February 1966 assault force prepares to move out after landing in a rice field – a UH-1B "Heavy Hog" is parked closest to the camera. Paddy fields or wet clay soil could cause a laden Huey's landing skids to become stuck. Extraction could then be impeded due to reduced engine power in hot, high conditions, sometimes tipping the helicopter over sideways. (Getty Images/ Bettmann collection 515498012)

75mm recoilless guns, and two UH-1B gunships that came to rescue were shot down, together with a Bird Dog FAC aircraft.

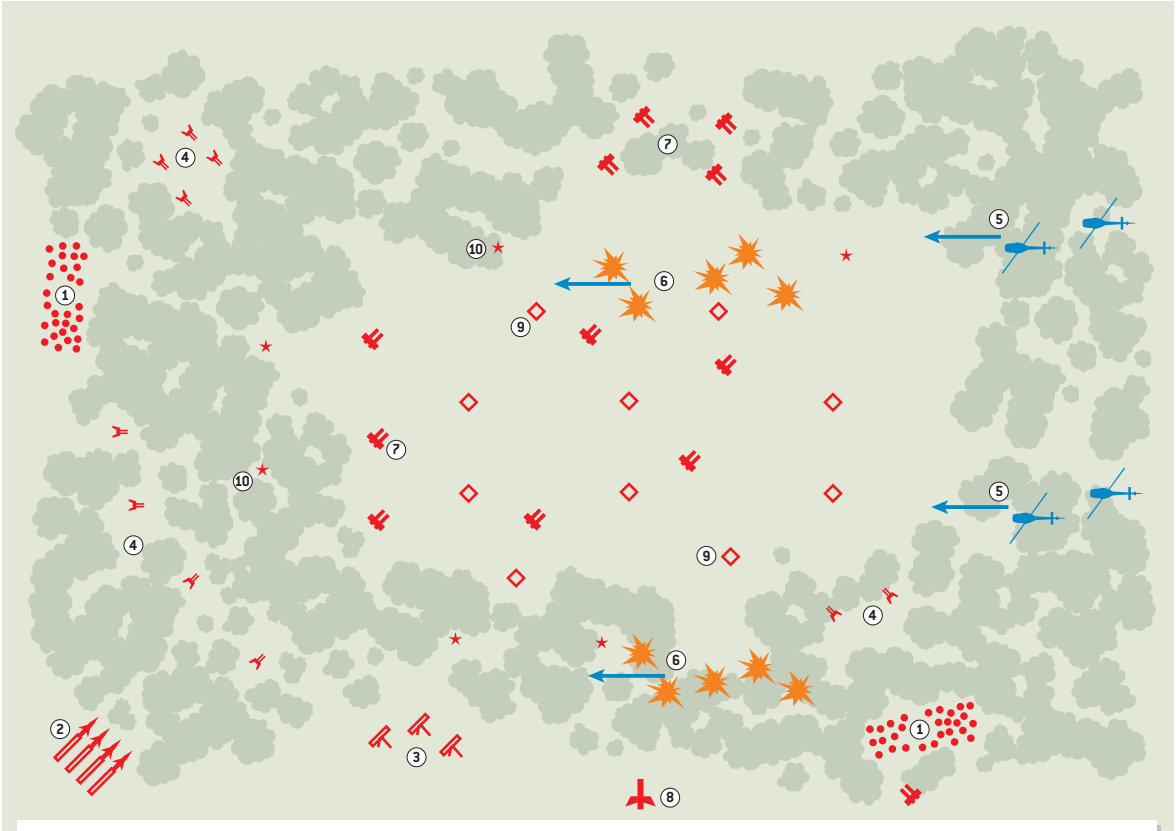
Eagle Flights were established to provide small rapid response forces, each comprising a command and control helicopter, seven "slicks," five UH-1B/C gunships, a medevac UH-1, and an airborne command helicopter. They were kept on alert to provide support for units under threat. At an LZ, the penultimate platoon to be extracted at the end of an assault would provide an Eagle Flight with its lift and gunships to protect the vulnerable final platoon to be lifted out. Hunter-killer operations in which gunships found targets for USAF A-1 Skyraiders were also flown.

By January 1965 there were around 250 UH-1s in Vietnam, operating with three Huey companies within the 13th Aviation Battalion at Can Tho, four more Huey companies (including the 68th, formerly the UTTHCO) in the 145th Aviation Battalion at Tan Son Nhut, and the 52nd Aviation Battalion with two UH-1 companies at Pleiku. They were in place by the time of the first large-scale US ground troop deployments by the 173rd Airborne Brigade in May 1965 to defend the air bases at Bien Hoa and Vung Tau – the brigade was supported in this task by the 1st Battalion, Royal Australian Regiment.

The 173rd Airborne Brigade began massive troop transport operations involving 144 helicopters in June 1965, and the 1st Brigade, 101st Airborne Division arrived in-theater the following month. It was based at the extensive helicopter airfield at An Khe (known as the "Golf Course" but officially named Camp Radcliff), rather than being distributed to several bases as Gen Westmoreland had originally wished.

During the 1st Cavalry Division's first deployment it became heavily involved in the relief of the Special Forces camps at Plei Me and Duc To, near the Cambodian border, in Operation *All the Way*. They were primary objectives in the NVA's move on Pleiku City, with the three regiments involved in the siege including a battalion equipped with twin-barrel ZPU-2 14.5mm AAA. A second company, attached to the 996th Battalion, had 12.7mm guns, which it had already used to shoot down two B-57B Canberra bombers. As the first large airmobile division, the 1st Cavalry

A staged photograph of a female AAA company in the 4th Military District. Each of the unit's 14.5mm gas-operated ZPU-1 guns fired armor-piercing or incendiary bullets that could severely damage a helicopter at altitudes of up to 4,000 ft. Variants of the ZPU-1 were still in use during Operation *Desert Storm*. (Dr. István Toperczer collection)



1. Combat groups of eight to ten NVA troops hide in bunkers behind ridgelines near the LZ ready to attack.
2. 122mm rocket launchers were sometimes set up 1,000m from the LZ.
3. Mortars were fired from hidden locations behind the treelines.
4. Groups of heavy 12.7mm and 14.5mm machine guns fire from concentrated triangular sites or from hidden, mutually supporting locations in the trees.
5. UH-1C gunships precede the UH-1D transports after initial attacks by artillery and tactical air strikes.
6. Tactical strike aircraft drop 500 or 750lb bombs or napalm into the treelines.
7. 23mm AAA guns are established in square or circular site patterns on high ground overlooking the LZ, or individually to defend the bunkers.
8. A single 37mm AA gun is sited near the LZ with a clear view of the approaching assault force.
9. Claymore mines are dug into the ground on the LZ to explode when helicopters land. Some would be detonated by artillery.
10. Improvised explosive devices, triggered remotely or by contact, are distributed in the grass and undergrowth.

Division was committed to combat in the Ia Drang Valley, where the Plei Me outpost came under attack by three NVA regiments on October 19–20, 1965.

The resident ARVN troops delayed the deployment of an armored relief column until 1st Cavalry Division support was guaranteed. US Army Green Berets (Special Forces) repelled a considerably larger enemy force and pursued the fleeing troops into the jungle, supported by several UH-1 gunship platoons including the 20th Artillery's ARA UH-1Bs and the 155th AHC. No fewer than 89 UH-1B gunships were involved, including an XM3-equipped "Hog" with 48 rockets and a grenade-firing "Frog." The majority had "flex guns" and 14 rockets. One was lost trying to defend a medevac Huey that had been downed by heavy machine gun fire. Gunship support was directed by tank commander Lt Brady Thompson.

Together with ordnance from F-100 Super Sabres and heavy gunfire from tanks, the combined US Army/ARVN force managed to drive the NVA's 32nd Regiment

This LZ, surrounded by forest and undergrowth cover, has been cleared by bombing and artillery. North Vietnamese forces have prepared defenses against a helicopter assault. Sharp stakes have been inserted into the ground to penetrate landing helicopters and foxholes have been dug from which individual troops will emerge and fire at the helicopters. Troops with automatic weapons wait in the treelines.

OPPOSITE
When in the fixed forward position, the UH-1C's rockets and miniguns were fired via the XM60 reflex sight system mounted above the right seat (pilot) windshield. The co-pilot (left seat) could also shoot them using the XM6 sight on the swing-down mechanical arm stowed above his windshield. He could also operate the miniguns in the "flexible" aiming mode. The XM6 sight had a standard "pipper" that was slaved to the miniguns, which were moved electrically in order to hit the target chosen by placing the "pipper" on it. The GAU-2/A six-barrel miniguns were set to fire at 2,400 rounds per minute – 80 rounds per second. A 2.75in. rocket, with a 17lb warhead, had a similar shock effect to a 110mm artillery shell.

into retreat. The 33rd Regiment also withdrew to its Chu Pong base area, which was unknown to US intelligence at the time.

Brig Gen Stan Cherrie, in the "Bounty Hunters" gunship platoon of the 191st AHC, recalled the effect of the XM5 grenades when his infantry group faced a "human wave" attack by 300 enemy troops. "I'm in the left seat, my armament is 4,400 rounds of 40mm ammunition. My aircraft commander has 38 rockets. We have four gunships heavily laden like that. We killed about 200 of them in about 20 minutes." Monitoring the ammunition levels in such "hot" situations was important, as Cherrie explained. "You're going in, and if you've got a treeline or line of nipa palms, the temptation is just to keep picking them off, 'Bam! Bam! Bam!' It's a big rush. You have also got to be careful of target fixation, where, before you know it, you're so damned low you're almost flying into the target."

Although generally successful, with only two helicopter losses in 54,000 sorties over 35 days, the Plei Me operation changed some aspects of the airmobile concept. Battle experience showed that CAS by gunships and artillery still required fixed wing strikes by tactical aircraft – during the campaign, the USAF flew 464 CAS missions. US Army commanders also requested a number of B-52 strikes, while A-1 Skyraiders took out enemy rear base camps and supply depots in mountainous terrain near the Cambodian border.

Plei Me also caused a revision in the composition of helicopter platoons, increasing the proportion of gunships. Instead of one UH-1B gunship to five UH-1B/D "slicks," one gunship was provided for three "slicks" – troop transport flights, known as "lifts," typically involved two to four UH-1s, depending on the size of the LZ. The insertion of an infantry company would take several "lifts," the "slicks" usually flying in trail formation behind the flight leader (who did all the navigation) to collect the troops. Other formations could be used, depending on the size of the pick-up area. Gunships flanked the group.

Artillery "prepping" was directed around the LZ, with a final white phosphorous round to indicate that the helicopters could approach. The gunships went in first, lacing treelines and suspected enemy positions with gunfire. If they received return fire they could respond with rockets. Although small arms fire would be hard to see, gunship pilots would try to warn the "slicks" of machine gun or rifle fire sources. "Slick" pilots aimed to land close together near to treelines so that their "passengers" would have the shortest possible run for cover. Often, tall elephant grass on the LZ hid saturated ground, rocks, or tree stumps, in which case the troops disembarked from a few feet above the ground.

Armed UH-1Bs, although 10mph slower than "slicks," were invaluable in combating enemy gunfire around LZs. They reacted instantly to the muzzle flashes of enemy weapons and hit mortar-firing positions with rockets. NVA commanders urged their troops to move close to incoming US forces to make air strikes harder to conduct without "friendly" casualties. UH-1Bs, firing within a few hundred feet of the opposition, reduced this advantage, and remained in the vicinity to suppress any subsequent threats.

On October 26, 1965, Gen Westmoreland decided on a policy of pursuing and attacking the retreating NVA. The following month, the 1st Cavalry Division's 227th AHB moved to a new base near the Ia Drang Valley that was quickly nicknamed the "Turkey Farm." The camp was situated at an altitude of 2,500ft, which, combined

Jim Laur

with the heat and humidity, put helicopters at an immediate disadvantage. Located near the borders of Cambodia, Vietnam, and Laos, and close to crucial sections of the Ho Chi Minh Trail, the base came under frequent attack by enemy insurgents.

The "First Team" (as the 1st Cavalry Division was known to journalists in-theater) entered the Ia Drang Valley and destroyed a major NVA base on November 14, 1965. Reconnaissance by rocket-firing "Red Team" UH-1B/C gunships escorting the intrepid OH-13S Sioux "White" platoon scout pilots of the "First of the Ninth" Cavalry located a hospital area on November 1, which yielded revealing documents. When more than 100 brown-clad NVA troops tried to attack US forces near this site, they were driven back by gunships and ARA rockets. Four NVA mortar positions were also silenced by gunship fire. At one point four ARA UH-1Bs, line abreast above the LZ, fired a barrage of 120 rockets into the mortar batteries.

A similar 2nd Battalion, 20th Artillery ARA assault on VC forces trying to invade the helicopter base at Catecka two days earlier drove the enemy away before their sappers could destroy vulnerable Hueys on the ground.

When Jerry R. Brooks was assigned to the 20th Artillery, 1st Cavalry Division, flying UH-1B/Cs, it was the only unit of its kind. Missions in the "underpowered and overloaded" UH-1Bs were customarily "short and violent. Some battles developed into prolonged engagements, such as the one in April [1966] in the Ia Drang Valley. Our unit was involved all night and fired more than 3,000 rockets."

Returning to mid-November 1965 and the Ia Drang Valley, as the pursuit of the retreating NVA continued, gunships frequently forced enemy troops to break contact. Large quantities of weapons were captured during this period, including 13 of the 33rd Regiment's 18 anti-aircraft machine guns. Further armed reconnaissance flights caused 99 enemy losses. A whole battalion, the 1st of the 7th Cavalry (later replaced by the 3rd Brigade) under Col Harold Moore, was airlifted by 229th AHB, Company A and Company B UH-1Ds into LZ "X-Ray" – cleared by heavy artillery fire, and less than 300m wide – at the foot of the Chu Pong Mountain. A gunship company with XM16-equipped UH-1Bs provided protection and 20th Artillery ARA rocket ships prepared the LZ. A captured NVA scout soon revealed that the mountain was unexpectedly occupied by 1,400 NVA soldiers of the 33rd and 66th Regiments.

As soon as the landing by the first eight UH-1s began, the NVA's Gen Chu Huy Man abandoned his planned attack on Pleiku and ordered his two regiments to attack the American troops. His men stealthily advanced to within 90ft of the helicopters, causing numerous casualties and destroying two UH-1Ds. They advanced on the initial batch of 150 Bravo Company troops, quickly surrounding the 2nd Platoon. Col Moore, commanding the operation from the shelter of a large anthill, called in artillery, air strikes and reinforcements by two more companies, and managed to bring in the rest of his battalion over four hours using his 18 helicopters.

The NVA fought as close as possible to the Americans ("grabbing the enemy by the belt") to deter artillery, and air strikes. As Gen Krulak observed, NVA tactics generally were "seeking to attrite US forces through the process of violent, close-quarters combat, which tends to diminish the effectiveness of our supporting arms."

More than 4,000 artillery rounds were fired, sometimes exploding within 150ft of American positions, and tactical aircraft flew 300 sorties. One platoon pursued a decoy group of NVA troops but it was ambushed and cut off, effectively delaying the

withdrawal of the whole battalion by three days. Further attacks by more than 1,000 well-trained NVA troops on the 450-strong airmobile force resulted in bitter fighting at close quarters, many acts of heroism, but also heavy casualties. Heavy artillery and USAF A-1E Skyraiders provided suppressive fire and an A-1E was shot down by the 66th Regiment's 12.7mm AAA battery. Moore's battalion was lifted out and replaced by the 2nd Battalion, 5th Cavalry (2/5th) and the 2/7th until November 17.

A B-52 strike on the Chu Pong Mountain was scheduled for that date, so the 2/7th had to head off on foot to LZ Albany, three miles to the east, to be airlifted out. They walked into a massive force of 66th Regiment troops eager for revenge, resulting in another 155 US soldiers being killed – the highest number of casualties suffered by the US Army since the Korean War. The LZ was too dangerous to attempt an airlift from until the enemy had been driven off by artillery, 2/20th ARA rockets, and A-1E napalm strikes, the NVA suffering at least 634 fatalities. By November 26, the steady pressure on communist forces had increased their losses to more than 1,800.

Generally, the operations in October and November were considered successful in driving enemy forces back into their Cambodian lairs, despite the unexpected, severe, loss of 304 troops from the 1st Cavalry Division.

In May 1966, all US Army aviation units came under the command of the unified 1st Aviation Brigade in order to standardize procedures and organization. During that year Gen William Westmoreland remarked that "airmobile operations came of age." All maneuver battalions became skilled in the use of the helicopter for tactical transportation to achieve surprise and out-maneuver the enemy. Sometimes, major targets of opportunity presented themselves, as the 336th AHC "T-Birds'" gunships discovered when trying to locate a missing ARVN patrol near Ba Tri in November 1966. The unit's historian noted:

> Upon arrival in the area, the "T-Birds" observed an estimated 300 uniformed VC running towards a palm grove. At first it was hard to believe that this many VC had been caught in the open, but when they turned and began firing at the gunships there was no longer any doubt. There was then a furious 20-minute battle while the "T-Birds" expended all their ordnance. When the dust cleared, the three gunships had killed 167 hard core Viet Cong.

One UH-1B took 19 hits during the engagement, with one of the rounds partially severing the tail rotor cable.

In February 1968, a major threat to Camp Holloway and Special Forces camps in the surrounding area was detected when a large force from the NVA's 66th "Tiger" Regiment was spotted moving into the nearby Plei Trap Valley. UH-1Cs duly patrolled the area regularly to assess the threat. A successful recovery of a 200-man task force from the area in March was met by extraordinarily heavy fire from around 3,000 NVA troops, costing 17 helicopters. Action in the Plei Trap region continued into May, with small groups of American troops being surrounded or pursued by far larger NVA forces. Extraction of friendly troops became increasingly difficult, and it often had to be accomplished with substantial NVA elements nearby. During close-quarters fighting of this kind, one of a gunship pilot's main concerns was to avoid accidentally hitting US troops.

"Gladiator 36" was a UH-1B of the 190th AHC, and it is seen here near Tay Ninh in 1969 fitted with a XM21 system. Nose art was generally regarded as a morale sustainer in helicopter platoons, with images being devised and applied by crew chiefs or Vietnamese workers based on popular culture and pin-ups. Pilots in most companies flew the same aircraft repeatedly, depending on servicing requirements. (Dewey Wilhite)

By May 1968, the A Shau Valley was solidly NVA-occupied territory. Operations there were preceded by the relief of Khe Sanh, planned before the Tet Offensive, using Maj Gen John Tolson's 1st Cavalry Division (Airmobile). Naming the relief effort (beginning on April 1) Operation *Pegasus* reflected the importance of airmobile forces within it. Their first task was reconnaissance by helicopters of the 1st/9th of the vital route area along Highway 9 from Ca Lu to Khe Sanh. They also found targets for B-52 strikes and flew similar operations in mid-April in advance of the 1st Cavalry's advance into the A Shau Valley area. Armed and unarmed UH-1s and USAF O-2A FAC aircraft flew at treetop height searching for gun positions, bunkers, and troop concentrations as targets for B-52s and tactical strikers.

Although such missions were hazardous for Huey crews in an area full of 23mm and 37mm AAA, it was a better way of identifying targets than photo-reconnaissance, particularly in the prevalent low cloud conditions. The detection of unexpectedly numerous AAA sites was, in fact, one of the 1st/9th's most useful contributions to this phase of the campaign. It also participated in an airborne assault near A Luoi to cut the main supply route from Laos for AAA ammunition for NVA gunners.

Air strikes with heavy bombs cleared some LZs, but also drew in NVA defenders, who set up numerous AAA positions along the anticipated helicopter approach route to one of them. Nine UH-1s were subsequently shot down, with three more lost to withering machine gun fire in a Special Forces insertion at the entrance to the A Shau Valley.

Clearing forest LZs big enough to accommodate five UH-1s at a time required F-4 and F-105 air strikes (dropping 300 heavy bombs) over two days, and some of the trees survived even that onslaught. In the subsequent Operation *Delaware*, which lasted four weeks from April 19, 1966, the NVA suffered more than 900 casulaties and lost massive quantities of supplies and weapons. Twenty UH-1C/Ds were destroyed in return.

UH-1s continued to support A Shau Valley operations, including the assault on the NVA fortress at Ap Bia, later dubbed "Hamburger Hill" due to the heavy casualties on both sides – by May 16, US losses amounted to 320 troops. In addition to casevac flights, gunships conducted armed reconnaissance at low altitude, dropped tear gas into enemy bunkers, and broadcast invitations to surrender. Of the 800 NVA troops at Ap Bia, only two capitulated. Eleven assaults were made against enemy positions on the hill, and it was finally taken with more than 1,000 NVA dead, officially giving the US command of the A Shau Valley. However, unfavorable US press coverage of the action negated the success, and the hill was soon re-taken by the NVA.

As President Richard Nixon's "Vietnamization" policy gathered momentum in 1970, incursions into Cambodia to interrupt NVA supply lines began. A 1st Air

Cavalry Division (Airmobile) force of 87 UH-1Ds and gunships inserted a whole brigade into the Fishhook area of Cambodia on May 1 for Operation *Toan Thang 43*. It took only two hours to complete, and there were no troop losses. As an extension to the *Fishhook* incursions during May by US Army and ARVN units, helicopter LZs were established by three C-130s, which dropped 15,000lb "Daisy Cutter" bombs to clear areas of forest with one blast.

As most enemy movement took place at night, US forces had to invest massively in technology to detect this activity. The defense industry offered a range of night vision magnifiers, infra-red detectors, and low-light television systems for aerial use. Infra-red systems such as the AN/ASQ-132 fitted to UH-1Ms could locate targets in very low light conditions, but bright illumination, including flashes from the helicopter's minigun tracers, blotted out night vision images, requiring the use of low light tracers.

From mid-1966, gunship UH-1s often worked with USAF AC-47 "Spooky" gunships. In June, a US artillery battery near Dak To came under heavy NVA attack, and four UH-1Bs and an AC-47 deluged the enemy with gunfire. Dense forest cover allowed the NVA to capture one gun (later recovered by the 101st Airborne) before they were driven back by the UH-1Bs.

By day, decoy tactics were sometimes used. A gaggle of UH-1s with gunships would make repeated, simulated troop deliveries to a remote area in the hope of persuading enemy gunners to position their weapons around it. The real landing would then be carried out at the intended LZ, which the enemy had hopefully vacated. Throughout any such operation, gunship crews would have been acutely aware of the need to identify friend and foe correctly and avoid any US Army or ARVN casualties. At very low altitudes ricochets could cause losses amongst troops on the ground.

When OH-6A Cayuse scout helicopters became available from 1969, air cavalry direct fire support ("light" or "heavy") was provided by one or two UH-1Cs, with an OH-6A finding their targets. Air cavalry teams were on alert to provide this support, and boost an assault company's own gunships. Search and destroy missions could be among the most hazardous, as pilots deliberately attempted to draw fire from suspected enemy positions by flying at low altitude. Unless they were mortally damaged, they could then attempt to destroy the threat with their own rockets and guns. Few gunships returned without numerous bullet holes.

One of the most bizarre roles for Hueys was the "people sniffer" mission – one of many experiments in the ceaseless effort to reduce human traffic on the Ho Ch Minh Trail. A UH-1H carrying a monitor to measure levels of ammonia in the atmosphere flew slowly at tree-top height, hoping to detect emissions

Troopers leap from their "slick," which is hovering over terrain where broken tree stumps prevent a landing, near Dak To in 1967. A one-helicopter LZ could be created in forests by dropping a 15,000lb BLU-82 bomb from a *Commando Vault* C-130 Hercules or a CH-54 helicopter, clearing trees in a 50m diameter area without leaving craters or debris to damage a Huey. (Getty Images/Bettmann collection 515036764)

This 116th AHC "Stingers" UH-1C was photographed at Duc Pho in 1970. The UH-1C had a back-up hydraulic system to aid survival should it be hit by gunfire. Its pitot tube and FM antenna were moved from the UH-1B's nose position to the cabin roof. This particular helicopter also has the "particle separator" (dust filter) screens fitted around the engine intake – a Vietnam "field modification" from 1967. (Robert Brackenhoff)

from humans. The suspected site was then marked with an M18 smoke grenade, followed by gunfire from UH-1C gunships. On most occasions the ammonia was probably from animal deposits. These risky tests resulted in several Huey losses and termination of the program.

Gunship pilots faced a very different threat when they were asked to devote their "blade time" to escorting Operation *Ranch Hand* C-123 Providers as they sprayed herbicide to "undress" NVA jungle hideouts. Two UH-1Cs followed close behind the C-123s at an altitude of around 200ft, ready to respond to any ground fire that the sprayers noticed. Sometimes, Hueys had to fly in the mist of Agent Orange defoliant when they maneuvered to face threats. Gunship crews were assured that the chemicals were harmless to humans – an assertion that was subsequently found to be grotesquely untrue.

Convoy escort was another gunship responsibility. Although helicopters could deliver some military supplies throughout South Vietnam, the majority still traveled by road convoys. VC forces were well aware that fuel tankers were the most conspicuous targets in those convoys, and from ambush positions it was easy for them to fire RPGs and explode one. When gunships swooped down to locate the shooter, they took machine gun fire from other positions in an ambush set-up. Mortar positions were usually surrounded by troops with AK-47s, hoping to catch a gunship at low altitude.

The gunships' versatility and comparatively long loiter time made them vital when it came to protecting landings by USAF C-130s and C-7As supplying outposts such as the Green Berets' base at Ben Het, near the Ho Chi Minh Trail, in mid-1969. When gunship pilots encountered AAA fire from a self-propelled anti-aircraft gun (SPAAG) – probably the twin 37mm cannon fitted to Chinese Type 63 tanks – the vehicle was destroyed by rockets from a UH-1C. By mid-1972, Type 63s had been replaced by the more effective ZSU-57-2 SPAAGs with twin 57mm anti-aircraft weapons.

By 1968, gunship operations had expanded into hunter–killer missions to detect targets of opportunity. Small groups of troops were fired upon, and a day's missions would usually include calls to tackle them, or suspected supply bunkers, in several

locations. Inevitably, civilian casualties occurred and gunship crews became particularly unpopular among the South Vietnamese villagers.

AH-1G Cobras began to share the gunship role with UH-1B/Cs in 1969. For Operation *Apache Snow* in May of that year, concerted attempts were made by the 101st Division and ARVN forces to sweep the NVA from their long-established strongholds in the A Shau Valley. ARA Cobras followed up numerous air strikes in "prepping" LZs for the assault Hueys, with some of the hardest fighting taking place around fortified NVA hill positions.

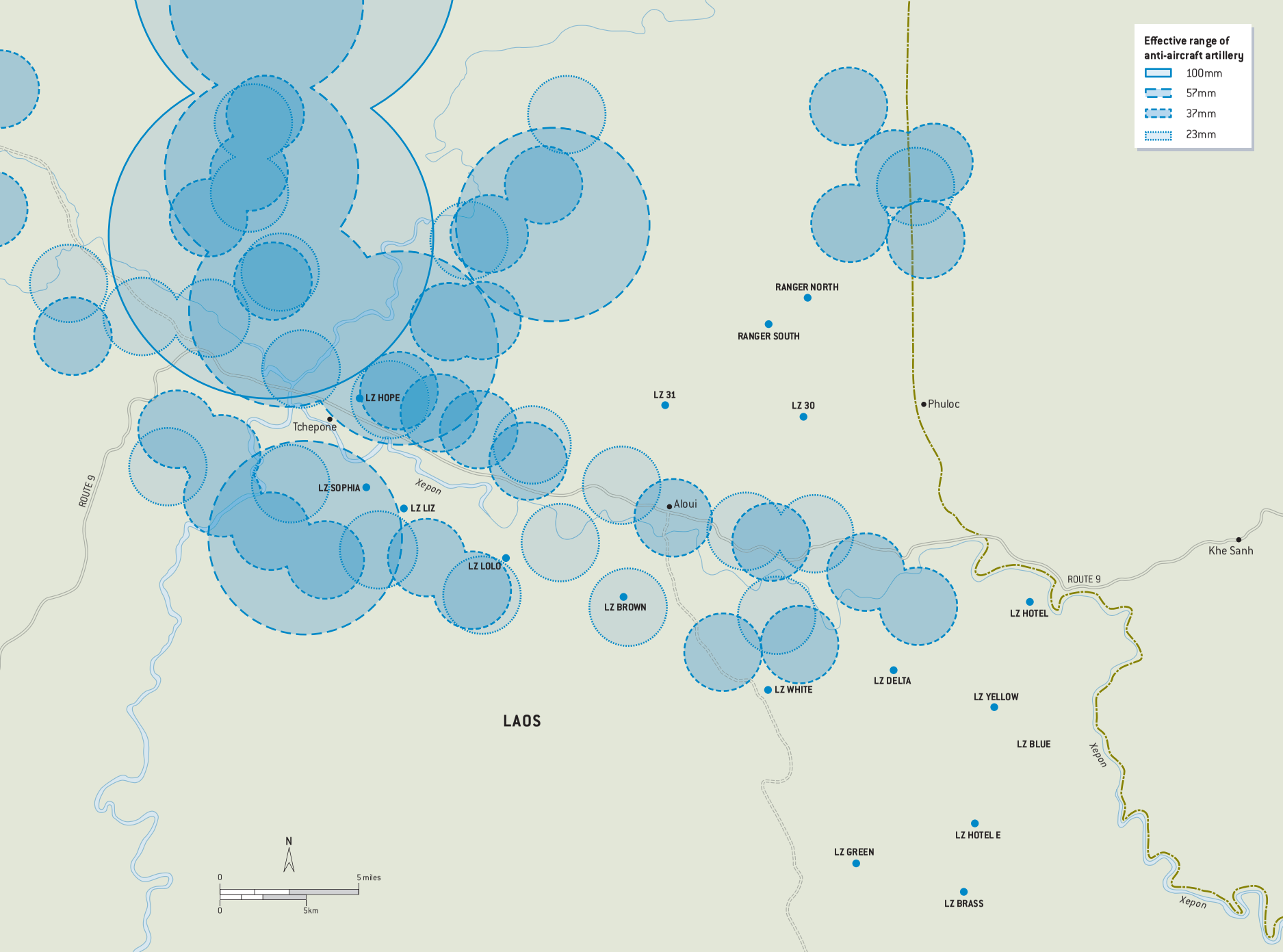
OPERATION *LAM SON 719*

Hanoi's Politburo studied President Nixon's Vietnamization plans closely, and judged that ARVN forces with American support would attempt to conduct offensives into Laos during the 1970–71 dry season. Two regiments were moved secretly during the summer of 1970 to reinforce the Route 9 area – the most obvious route into Laos from South Vietnam. Three more divisions were deployed in October, supported by Group 559, which provided roads and logistics areas for 36,000 tons of military supplies – enough for five months of operations. Crucially, the reinforcements for "Front 702" in Laos included ten AAA battalions, bringing the total AAA force to 19 battalions with more than 300 weapons.

It was inevitable that the US would have to respond to the massive North Vietnamese stockpiling of supplies in southern Laos ahead of Hanoi's plans to invade both Cambodia and South Vietnam. Attempts to reduce those caches and supply lines would be made by three ARVN divisions, and they required US airmobile capability, organized by Lt Gen James Sutherland. Codenamed Operation *Lam Son 719*, this would prove to be the last of many US airmobile campaigns in Vietnam, and the first – by Congressional order – without American troops on the ground. The US helicopter pilots who would lift the ARVN troops into battle and suffer many losses themselves were officially described as "non-combat troops" for political expediency.

The lift required units of the 101st and 1st Aviation Groups with UH-1C/D/Hs and AH-1Gs, as well as CH-53Ds transport helicopters from a US Marine Corps squadron. A preliminary move by the 101st Airborne during a decoy extension of Operation *Dewey Canyon II* sent a feint attack towards the A Shau Valley. The US four-stage plan was devised separately from those made by the ARVN, partly for security reasons. In fact, the US press managed to deduce and publish enough information about the attack to render attempts at secrecy pointless, giving the North Vietnamese another four days to bolster their defenses.

The NVA was, therefore, well prepared when *Lam Son 719* began on January 30, 1971 with a massive troop airlift by more than 300 "slicks" and gunships. Because of inadequate intelligence gathering after the withdrawal of most American air power, ARVN troops were unaware that they would be opposed by what Hanoi considered to be the greatest concentration of combined forces in its history. NVA Col Gen Van Tien Dung felt he could demonstrate that the US policy of Vietnamization was a failure.


Effective range of anti-aircraft artillery
100mm
57mm
37mm
23mm
RANGER NORTH
RANGER SOUTH
LZ 31
LZ 30
Phuloc
LZ HOPE
Tchepone
ROUTE 9
LZ SOPHIA
LZ LIZ
Xepon
Aloui
LZ LOLO
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The US plan was later criticized for relying too heavily on helicopters, rather than calling in more tactical air power. This was intentional, as the US Army had studied the weather conditions and judged that tactical bombers would be unable to offer help in such heavy cloud for much of each day. US Army generals therefore preferred to use their own air-to-ground resources, managed by the 101st Airborne Division, although they underestimated the impediment caused to such operations by thick cloud around the mountainous Laotian landscape.

The UH-1s, AH-1Gs, OH-6As, CH-47s, and even a few CH-54s traveled from their airfields in South Vietnam to assemble at the forward base at Khe Sanh, reoccupied during *Dewey Canyon II*. Although Cobras were the US Army's dominant gunship, the size of the operation demanded that UH-1Cs made up the numbers. *US Army* magazine reported "the sudden appearance of Charlie-model gunships, which were a rarity in Northern I Corps in the early 1970s. Many sported wild nose-art such as colorful shark-mouths, jokers, spades, etc. in contrast to the staid geometric designs used by the 101st Airborne Division."

Prior to making the six-mile flight into Laos, "slicks" had collected ARVN troops, including Rangers, from Lang Vei. They then headed for the four designated LZs ("Lolo," "Liz," "Sophia," and "Hope," named after American film actresses) near Route 9 and the abandoned French airstrip at Aloui. As the helicopters approached their LZs, enemy opposition was immediate, and the gunships moved in to suppress it. ARVN Gen Nguyen Duy Hinh reported "500 to 800 sorties of cavalry gunships" daily.

Some landings had to be called off until further air strikes were arranged. In one case, 52 fighter-bombers dropped napalm and bombs around an LZ, only for the AAA to resume when the helicopters reappeared. In another, B-52 strikes and a 15,000lb bomb were aimed at an LZ area, but the enemy AAA quickly moved back with reinforcements. Heavy cloud forced the UH-1Cs and AH-1Gs down into

OPPOSITE
When ARVN forces and US Army helicopters began the westward journey into Laos along Route 9 from Khe Sanh to Tchepone at the start of Operation *Lam Son 719* on January 30, 1971, they were unaware of the thorough preparations undertaken by the NVA in the weeks leading up to the airborne assault. Flying into the LZs in Laos, the helicopter pilots were targeted by some of the heaviest AAA encountered by airmobile forces during the entire war. Machine guns and small arms around the LZs were backed by numerous 23mm, 27mm, 57mm, and 100mm guns emplaced in favorable positions to meet the incoming helicopters and inflict heavy losses.

The wreckage of UH-1C 66-15045 *EASY RIDER* of the 174th AHC "Sharks," photographed at Duc Pho in 1970. This unit took part in *Lam Son 719*. UH-1C 66-15242 was similarly marked. (Robert Brackenhoff)

UH-1C 64-14170 *Ace of Spades* in 1970 in 174th AHC "Sharks" markings, and with its miniguns angled downwards. The UH-1 was known to NVA gunners as the "flying ladle" or "dipper" due to its appearance side-on and attitude when landing. (Robert Brackenhoff)

valleys that were lined with AAA of all kinds. Pilots were, "surprised by the volume of fire from large-caliber guns at Lau Son." They had been told to expect "soft" targets like infantry, trucks, and artillery. Instead, they encountered tanks and extremely heavy AAA fire carefully arranged to catch them at the most vulnerable parts of their missions – landing and taking off. It was worse than anything the crews had faced in South Vietnam, and it included AAA units rapidly re-deployed from sites on the Ho Chi Minh Trail – a comparatively short distance away by road. As one pilot remarked to *US Army* magazine, "In Vietnam, we were the hunters. In Laos we are the hunted."

Several "slicks" were shot down as they approached at around 3,000ft – too high to identify and fire back at the numerous camouflaged AAA positions. NVA "0.51-cal." guns and 37mm AAA were particularly destructive at those altitudes, while most of the opposition on the LZs came from AK 47s fired by troops hiding in the trees, undergrowth, and carefully prepared foxholes close to the helicopters.

As the ARVN armored forces advanced along Route 9 towards Tchepone in three columns, the NVA moved quickly to block them, despite frequent US air strikes and fixed-wing gunship support. During airborne insertions on February 8–9, NVA gunners claimed 50 US helicopters. When the advance stalled, North Vietnamese reinforcements surrounded the armored column and ARVN firebases. South Vietnamese troops remained in place, relying on US air power (particularly B-52s) to prevent them being overrun. However, NVA forces closed in tightly around the firebases, preventing air strikes, and one by one they overran them. South Vietnam's President Nguyen Van Thieu was anxious to keep his casualties as low as possible, and he resisted the original plan to advance to Tchepone, suggesting instead a retreat via the A Shau Valley to raid NVA supply caches.

The airborne forces met the most concentrated AAA fire encountered at any stage in the war during *Lam Son 719*, the operation proving that the success or failure of airmobile assaults against well-prepared enemy defenses was heavily dependent upon fixed-wing air strikes, *as well as* helicopter gunships. Interference from bad weather, which occurred throughout the campaign, severely reduced the effect of that protective cover.

20th SOS UH-1Ps used the XM93 armament system, which featured hand-held XM134 (GAU-2B/A) 7.62mm miniguns with 10,500 rounds of ammunition. The guns could also be fixed to fire forwards, and the unit, with its flexible shell ejection chute, could be stowed behind closed doors. The rocket pod affixed to this helicopter is the longer LAU-61/A version. (US Army Aviation Museum)

In a rescue attempt for ARVN outpost Fire Support Base (FSB) Delta on March 21, "slicks" tried to land before a tactical strike could be executed. Seven UH-1s were lost and 50 others damaged as a result, and the evacuation had to be abandoned. Many of the occupants of these machines escaped to FSB Delta, from where they were eventually airlifted out. When NVA tanks invaded the FSB, ten were destroyed by ARA helicopters and USAF jets – the cause of the majority of the NVA's heavy losses (an estimated 20,000 troops were killed or wounded) throughout the battle.

Some LZs could only take one helicopter at a time, which meant that enemy troops surrounding the area had a shooting gallery of UH-1s entering slowly, 500ft apart, in single file, dropping their Rangers within seconds and relying on their door gunners and the gunships to suppress enemy fire, particularly the deadly 12.7mm guns. Air strikes around LZs in advance of landings became essential for the first time in the development of airmobile tactics. But solid overcast and the complexity of calling in strikes at short notice meant that Huey pilots often had to face the devastating gunfire with only gunship helicopters to try and deal with it.

Of all the tactical weapons available to take out fixed AAA gun sites, the Paveway I 2,000lb laser-guided bomb (LGB) was by far the most effective. However, its use was restricted by weather, a paucity of LGBs, and a limited number of F-4 Phantom IIs. Nevertheless, Paveway Is destroyed most of the 106 tanks lost by the NVA during *Lam Son 719*.

Within the huge cost of the failed offensive in Laos, the loss of 109 helicopters and 600+ badly damaged were both a tribute to NVA determination and proof of the vulnerability of even the most heavily armed helicopter gunships. Nineteen helicopter crewmen were killed, 11 were listed as missing in action, and 59 wounded. ARVN losses amounted to 1,500 troops killed or captured – far more than President Thieu had assumed. Violent anti-American protests erupted in Saigon when news of the high casualty rate was announced.

When the surviving ARVN forces were compelled to withdraw on March 18, Hanoi declared a resounding victory, claiming more than 20,000 enemy casualties

PREVIOUS PAGES
An XM26 wire-guided missile streaks from NUH-1B TOW 60-3553 of the 1st Combat Aerial TOW team, nicknamed "Hawk's Claw," assigned to the 17th Combat Air Group, 1st Aviation Brigade at Camp Holloway. At around 0630 hrs on May 14, 1972, a large NVA force advanced on Kontum City in South Vietnam. Two T-54 tanks, with infantry support, were seen fording a stream near the outskirts of the city, heading for thick undergrowth and woodland on the opposite side of the stream. A "Hawk's Claw" NUH-1B, with two AH-1G Cobra escorts, was called in and fired a TOW missile at the leading tank from an altitude of 3,000ft and at slant range of 7,000ft. The weapon scored a direct hit, causing the tank to explode, sending flames 30ft into the air. A second TOW was then fired at the remaining T-54, and it also exploded.

and huge losses of equipment – including 505 helicopters. While ARVN and US losses were far less, Hanoi could claim a significant propaganda victory. The communist government also boasted that it was the first time that the NVA had won a large-scale counteroffensive campaign in the "American war."

The US force reduction took the 1st Cavalry back to the USA on March 26, 1971 after more than five years of intense combat, leaving its 3rd Brigade in place at Bien Hoa until August 1972. The last major unit to leave was the 101st Airborne Division, which departed in January 1972. Its aviation units generally handed over their equipment to the RVNAF prior to pulling out of South Vietnam. By March 30, 1972, when the NVA began its massive Spring Invasion, the ARVN was left to defend South Vietnam alone until US air forces could return and provide the support that they had always relied upon.

Gunships lacked the dedicated weapons to destroy the many NVA tanks seen during *Lam Son 719*, although hits with 2.75in. Mk V rockets with newly developed XM247 warheads and 20mm fire could temporarily disable them. Cobras knocked out 13 T-54s in April 1972, however. At the end of that same month, the two NUH-1B gunships fitted with the XM26 TOW anti-tank missile "Package" arrived at Camp Holloway in anticipation of an attack on Kontum. On May 2 four tanks were destroyed, and the two TOW Hueys, with AH-1G escort, knocked out nine more as the Kontum invasion developed 24 days later.

During the 1972 campaign, 100 TOW missiles were fired, destroying 24 tanks, four APCs, and many other vehicles. With a success rate of more than 50 percent, the TOW missile was five times more effective than the SS-11 (M22) system. The TOW aircraft remained in use until the ceasefire on January 27, 1973, although most of the gunship activity in the closing weeks of the war involved AH-1 Cobras.

Wayne Evans points out the XM26 TOW system's scores marked up on NUH-1B 62-12554, for which he was Chief Engineer, at Camp Holloway during the Battle of Kontum in 1972. The six 50lb TOW anti-tank missiles were housed in pods on adapted carriers. (Ray Wilhite)

STATISTICS AND ANALYSIS

UH-1s were used by all four US forces in Southeast Asia for multiple tasks. With more than 26,600 examples eventually built, the Huey primarily served as the "airborne Jeep" for the US Army and US Marine Corps. Aside from carrying troops and undertaking the gunship role, their missions included medevac, reconnaissance, communications, propaganda dispensing, and even spraying Agent Orange defoliant. UH-1s laid down smokescreens to disguise troop advances, used massive banks of searchlights to seek out enemy forces at night, and dropped napalm. Their reliable, economical turbine engines, agility, and ability to absorb extraordinary amounts of combat damage made them principal players in what quickly became known as the "helicopter war."

The air cavalry concept had an uncertain start until it was proven in Vietnam. Final proof of its value was seen on February 26, 1973 when the last US combat elements were withdrawn from that country. All seven were air cavalry units that had been undertaking invaluable armed reconnaissance missions right up to the end of the US Army's presence in the war.

Producing pilots for airborne units was a gigantic task. Fort Wolters began helicopter pilot training in 1957, graduating just 35 "candidates" with 12 light helicopters. Ten year later, it controlled 1,200 helicopters and 28 staging areas (all named after Vietnamese towns), with 600 trainees completing its courses every month. The demand for helicopter pilots – 14,300 were needed in 1966 alone, although less than 10,000 were provided – far exceeded the supply of college graduates who could become commissioned officer aviators in the other services. Helicopter pilots became

Gunship crews had to operate throughout South Vietnam, often over villages where local guerrilla militia were ready to fire at any US aircraft. Training on machine gun sighting devices against aircraft and helicopters therefore took place at a local level. (Dr Istvan Toperczer collection)

non-commissioned warrant officers. Their instructors were mainly former military pilots working for companies such as Southern Airways of Texas.

"Boot camp" conditions continued to apply, with around 25 percent of Warrant Officer Aviation Program candidates being "washed out" of pilot training and reverting to infantry roles. Although aircrew shortages persisted throughout the war, the Aviation Warrant Officer program proved to be a wise move for it had produced more than 12,000 crewmen by 1970.

Although helicopters became essential to the conduct of the war, with a peak number of 3,400 in-theater, their operations involved considerable risk and cost. Assault landings at night were particularly difficult. Pilot losses amounted to 2,165, with a further 2,712 non-pilot crew members being killed. Of those fatalities, 2,382 occurred in UH-1s.

Hueys of all types completed the majority of the total rotary wing flight hours, with more than 10.5 million hours being flown by US Army examples between October 1966 and the evacuation of Saigon on April 30, 1975. In all, 7,013 UH-1s were deployed and more than 3,000 were lost, with UH-1D/H "slicks" taking the hardest hits – 1,121 were lost. Of the 11,835 helicopters sent to Vietnam by all three US services, 4,868 were downed either in combat or due to operational causes, although many were recovered and repaired or cannibalized. On average, more helicopters were lost due to operational accidents (weather, hazardous terrain, technical problems etc.) than to enemy action (2,566 against 2,066). Lack of spare parts reduced reliability and cut UH-1 availability to less than 70 percent in the early stages of the Plei Me action.

UH-1Bs, of which the majority served as gunships, and UH-1Cs sustained 378 and 417 losses, respectively, with 670 crewmen killed. The small OH-6 scouts, fighting face to face with the enemy, suffered badly, with 964 losses out of 1,422 deployed, and 484 crew deaths. Pilots of its predecessor, the H-13 scout, in the 1/9th Cavalry squadron sustained 14 deaths out of their original complement of 20 pilots within six months of arriving in-theater as they tried to draw enemy fire at close quarters to reveal troop positions for gunship helicopters. AH-1 Cobra losses amounted to 270 out of 950.

Seen against the enormous total of missions flown, however, helicopter losses ran at about one per 1,300 sorties. The UH-1 accumulated more combat time than

any other aircraft. Its record in casualty evacuation alone was unparalleled, with more than half-a-million medical evacuations being flown in Vietnam alone. Almost four million attack sorties were undertaken, mostly by UH-1 gunships, which proved to be particularly lethal against enemy troops in the open. An initial firing pass would be followed by a stream of fire from the door gunners while the pilot turned to make a second pass with guns or rockets. NVA/VC forces sought to avoid this situation by building strong bunkers and using camouflage. When firing from open positions, the number of hits on attack helicopters by enemy troops was surprisingly small.

Up to half of UH-1 combat losses were attributed to fuel fires caused by hits on their unprotected fuel tanks – a perpetual source of anxiety to crews. In some cases, those hits could lead to a mid-air explosion with the loss of all on board. Despite these risks, the gunships' contribution was invaluable. The 1st Aviation Brigade reported that its UH-1Cs and AH-1Gs "were credited by many ground commanders as being the decisive factor in a number of battles, particularly in the Saigon and Long Binh areas during the Tet Offensive."

Having proved the gunship/armed scout concept, the US Army sought other suitable platforms, including the CH-47A Chinook following experiments with forward-firing "flex guns" in an ACH-21 Shawnee. Four were modified as "Guns a Go-Go" ACH-47A gunships in 1965, with a 20mm gun or M5 40mm grenade launcher in a nose turret, XM158 rocket launchers, and two more fixed 20mm guns. Location points for five more machine guns, firing to the sides and rear, were included. They reminded UH-1C pilot Jerry R. Brooks of "an aerial stagecoach, with smoke and fire erupting from all portals," but they were "too expensive and vulnerable."

Three ACH-47As were sent to An Khe for the 53rd Aviation detachment, and were then passed on to the 228th AHB of the 1st Air Cavalry. Aircraft 64-13151 *Stump*

NVA troops examine the burned wreckage of UH-1H 69-15793. Fuel lines were not armored, making them highly vulnerable to small-arms fire. Helicopters usually returned with a number of bullet holes, and these would be covered with zinc chromate colored patches pending more permanent repair. A hit by a "0.51-cal." bullet would cause far more damage. (Dr. István Toperczer collection)

The CH-47A Chinook was introduced with the UH-1 as the US Army's new turbine-equipped heavy transport helicopter in 1964–65. Four were converted to gunships, armed with a 40mm grenade launcher in the nose turret, five 0.50-cal. machine guns, and two rocket pods. Three of the four ACH-47As were sent to An Khe for the 53rd Aviation detachment, and were then passed on to the 228th AHB of the 1st Air Cavalry. (US Army Aviation Museum)

Jumper was destroyed in a taxiing accident and 64-13145 was sent to replace it. Sadly, the mounting pins for the M24A 20mm cannon in the nose-mounted chin turret of that aircraft separated during gun-firing at enemy targets near Bong Son in May 1967. The weapon swung upwards, firing its shells into the front rotor blades and causing the Chinook to crash, killing all on board. There was, therefore, no real chance to explore the ACH-47A's feasibility as a heavy-hitter operating in numbers with 1st Air Cavalry's UH-1B/C gunships.

The OH-6A Cayuse offered a smaller, faster addition to the UH-1 gunships, with a 150mph top speed. It was extremely maneuverable at very low altitude – almost literally eyeball-to-eyeball with the enemy at a range of just 50ft. LOACH pilots were accustomed to flying at just ten feet above the ground, with gunship escort above to watch for threats. OH-6As entered service with the 9th Cavalry in February 1968 to operate alongside UH-1B/Cs and AH-1G Cobras. Its service introduction was marred by a series of rotor head failures, although the LOACH soon became a successful addition to the US Army's helicopter inventory. Its lack of tail-rotor authority and a tendency to cut off its own tail-boom while auto-rotating caused other mishaps. The helicopter was tested with the XM8 40mm grenade launcher in 1969, the weapon being attached to the side of the OH-6 in place of the usual XM27 minigun.

The OH-58A Kiowa (Bell Model 206A), an entry for the US Army's Light Observation Helicopter competition, was bought and operated alongside OH-6As from August 1969. Fitted with an M134 minigun, it was less popular with pilots.

AFTERMATH

The UH-1B/C was always regarded as an interim gunship while the AH-1G Cobra, the first purpose-built attack helicopter, was developed and gradually took over gunship duties from 1968. The Cobra was also partly a stop-gap venture, as the US Army had ordered the far more complex Lockheed AH-56A Cheyenne armed escort helicopter in 1966. Cancelation of the Cheyenne in 1969 due to cost and technical problems left the UH-1B/C in service together with the AH-1G through to war's end.

The Cobra offered the clear advantage of a much-needed speed increase to 219mph at sea level, greater maneuverability, and a 247-gallon fuel supply that allowed it to loiter over a target three times longer than the UH-1B/C gunship. The AH-1G's narrow fuselage made the helicopter a much smaller head-on target. However, its loaded weight of 9,500lb was similar to the UH-1H (with a similar engine), and this meant sacrificing the heavy, armored glass originally intended for a bigger canopy and much of the protection for the power and hydraulic systems that had been major areas of vulnerability in UH-1s. There was also no effective air conditioning or temperature control in the confined cockpit with its sealed canopy.

Operational versions of the "snake" usually carried the same 2.75in. rocket pods as the UH-1B/C on stub wings, with two M200A-1 19-round pods and two M158A-1 seven-shot units as a typical load. Fixed armament was the TAT-141 turret, with either two GAU-2B/A 7.62mm Miniguns or one M134 Minigun (firing at up to 4,000 rounds per minute), and an M129 40mm grenade launcher. M18 pods housing M134 Miniguns or M195 20mm guns could also be carried on the stub wings in place of rockets.

The AH-1Gs were feared by the NVA, who called the sharkmouth-painted 3/4th Cavalry "Centaurs'" helicopters "red-headed beasts." Cobra pilots regretted the loss of the UH-1's crew chief and gunner, as it limited their armed reconnaissance flexibility. Cobra variants remained in US Army service until 1999, although by then the

AH-64A Apache, introduced in 1987, had heralded a new and far more capable gunship generation.

The NVA's anti-helicopter capability was greatly expanded as the war neared its end. Deadly ZSU-34-4 self-propelled AAA units, attached to tactical units in four-vehicle companies, appeared in Laos at the end of 1971, adding to the large numbers of ZPU-4 multi-barrel 14.5mm guns and heavier AAA. The sheer volume of ground-to-air weaponry now in-theater caused enormous problems for ARVN and US helicopters during the invasion of South Vietnam, launched on March 30, 1972. It was countered most effectively by laser-guided weapons, which were only ever made available to US fighter-bombers in modest numbers.

As part of the Vietnamization program, President Nixon's Secretary of Defense Melvin Laird transferred enormous quantities of weaponry to the South Vietnamese, including UH-1 and CH-47 helicopters. By the end of the US presence in the country, the RVNAF had 21 UH-1 units, with more than 2,000 personnel trained to fly them. Many Hueys would be taken over by North Vietnam after Hanoi's 1975 "Ho Chi Minh Campaign" and the subsequent reunification of Vietnam gave the NVA access to large quantities of US military hardware. However, lack of maintenance facilities soon made most of it redundant. Post-war, Vietnam continued to rely on the Soviet Union, from whom it received more modern equipment. By 1987 it had 200 helicopters, including its own Soviet Mil Mi-24 "Hind" gunships. In 2016 it became possible to purchase military equipment from the USA and Europe, further modernizing the country's large, well-organized defense forces.

After 1975, the air cavalry concept still had its doubters who wondered how a helicopter force would survive on a more sophisticated battlefield with opposition from air power and modern armor. The vital role of gunships and scout helicopters in the world's armies in the 21st century's conflicts is testament to the work and sacrifice of the pioneers in Vietnam.

Although helicopters since then have become more capable, the principles of airborne assault established by UH-1 units in the 1960s still remain in force today. In the opinion of former UH-1C gunship pilot Jerry R. Brooks, "The success of Operation *Desert Storm* can be traced directly back to the trial and error tactics committed by the 1st Cavalry Division." Hueys, including the spin-off AH-1 Cobra, developed helicopter gunship tactics and technology far beyond their origins in the 1950s. Many UH-1N "Twin Huey" gunships remained in US Marine Corps combat use until 2014.

Their modern successors such as the Hughes (later Boeing) AH-64 Apache, Mil Mi-24, Kamov Ka-50, Eurocopter Tiger, and CAIC WZ-10 have brought digital targeting and heavier weapons to the battlefield, but they still owe much to the original Huey gunships. Despite the loss of more than 6,000 pilots and crewmen, the US Army's helicopter units were exemplars of determination, integrity, and heroic adherence to duty throughout the war as they introduced and developed a new form of warfare.

Work in the rice fields continues undisturbed around the wreckage of RVNAF UH-1H "White 534," which had been brought down by an SA-7 "Strela-2" shoulder-launched IR-homing missile during the Spring Offensive of 1975. The RVNAF had 21 Huey units, mostly equipped with UH-1Hs. Some had XM21 miniguns and seven-shot rocket pods, but the guns were often removed during the final airborne operations of the war at Phuoc Long and Xuan Loc in 1974–75 due to a lack of ammunition. (Dr. István Toperczer collection)

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INDEX

Page numbers in **bold** refer to illustration captions

A Shau Valley 35, 62, 65
ACH-21 Shawnee helicopters 75
Agent Orange 64, 73
air crew training 39–44, 73–74
An Khe Valley 35, **38**, 56, 75
anti-aircraft artillery 7, 15, **28**, 29–30, **56**
attrition policy 35–36, 38

Bell AH-1G Cobra helicopters 46, 72, 76, 77
Bell HU-1 Iroquois helicopters *see* Bell UH-1 Huey helicopters
Bell Model 47 helicopters 4
Bell OH-58A Kiowa helicopters 76
Bell UH-1 Huey helicopters **10**
  aftermath 77–78
  armament **12**, 12–14, **14**, **17**, 17–22, **19**, **22**, 23–26, **41**, **43**, 58, **58**, **69**
  camouflage 22, **23**, **40**
  chronology 8–10
  cockpit **42**
  in combat 52–72
  crew and crew training 17, 39–44, 73–74
  design and development 6, 11–14
  first deployment in Vietnam 6–7
  formations **53**, 54, **54**
  fuel requirements 37–38
  maintenance 43–44
  night vision 21, 22, **23**
  nose art **10**, **32**, **62**, **68**
  statistics and analysis 73–76
  strategy and tactics 31–38, 41, 53–55
  technical specifications 16–26
  variants 17–23
Bell XH-40 helicopters 6
Brooks, Jerry R. 60, 75, 78

Camp Holloway 43, 49, 61, 72, **72**
CH-47 Chinook helicopters 33, 37, 75, **76**
CH-47B Mojave helicopters 55
Cherrie, Brigadier General Stan 55, 58
chronology 8–10
Chu Lai **33**, 45

DeMailo, Alred S. 25–26, 28–29, 39, 40, 54
demilitarized zone (DMZ) 31, 38
design and development 11–14
door guns, UH-1 Huey 24
DShKM 1938 machine guns 7, 15, **15**, **26**, 27–29, **35**, **48**

Exercise *Sage Brush* (1955) 5

firebases 35
"Firefly" target illuminators 18, 44
fixed guns, UH-1 Huey 24–25, **69**
flex guns, UH-1 Huey **24**, 24–25, **25**, **43**

grenade launchers, UH-1 Huey 25–26, **41**

H-13 Sioux helicopters 4, 5, 33
H-21C Shawnee helicopters 6, 32, **53**, 55
hand grenades, UH-1 Huey 26
Harkins, General Paul D. 35, 36
"hearts and minds" policy 36
helicopters, US *see also* Bell UH-1 Huey helicopters
  ACH-21 Shawnee 75
  Bell AH-1G Cobra 46, 72, 76, 77
  Bell Model 47: 4
  Bell OH-58A Kiowa 76
  Bell XH-40: 6
  CH-47 Chinook 33, 37, 75, **76**
  CH-47B Mojave 55
  H-13 Sioux 4, 5, 33
  H-21C Shawnee 6, 32, **53**, 55
  Hughes OH-6A Cayuse helicopters 76
  Sikorsky CH-54 Tarhe "Skycrane" 33, 37
  Sikorsky H-19 Chickasaw 4
  Sikorsky HRS-1: 4
  Sikorsky R-4: 4
Hill 488, Battle of (1966) 45
Ho Chi Minh Trail 29, 35, 46, 48, 63–64
Hughes OH-6A Cayuse helicopters 76

Ia Drang Valley 36, 48, 57, 58–61
Indo-China War (1962) 5

Johnson, President Lyndon B. 32–33

Khe Sanh, Battle of (1968) 45, 50, 62
Kontum, Battle of (1972) 72, **72**
Korean War (1950-53) 4

landing zones (LZs) 7, 15, 26, 35, 50, **57**, 58
Laos 65–72
"Lightning Bug" target illuminators 18, **18**

M2 heavy machine guns 15
M75 40mm grenade launchers 25–26
M1939 anti-aircraft guns 7, **28**, 29–30
machine guns 7, **9**, 14–15, **26**, 27–29, **30**, **35**, **48**
maintenance, helicopters 43–44
McNamara, Robert S. 6, 36
medevac duties 6–7, 44, 75
mortars 7, 26–27

napalm 18, 67, 73
New Jersey, USS 38
night vision 21, 22, **23**
Nixon, President Richard 62, 65
NVA/VC forces
  aftermath 78
  in combat 52–72
  organisation and tactics **6**, 47–51
  recruitment **9**
  strength 48
  weapons 7, **9**, 14–15, **15**, **26**, 26–30, **35**, 36, **36**, **49**, **56**

Operation *All The Way* (1965) 56
Operation *Apache Snow* (1969) 65
Operation *Blue Marlin* (1965) 45
Operation *Delaware* (1966) 62
Operation *Double Eagle* (1966) 45
Operation *Frequent Wind* (1975) 47
Operation *Game Warden* (1966) 22, 44
Operation *Lam Son* 719 (1971) 65–72
Operation *Morning Star* (1962) 52
Operation *Pegasus* (1968) 62
Operation *Ranch Hand* (1962-71) 64
Operation *Starlight* (1965) 45
Operation *Toan Thang 43* (1970) 63

Plei Me 36, **48**, 56, 57, 58, 74
Princeton, USS 45

Republic of Vietnam Air Force (RVNAF) 47
rifles 14, 15, **29**, 30, **49**
rocket-propelled grenades 26–27
rockets, UH-1 Huey 23–24, **24**
Royal Australian Air Force (RAAF) 21, **46**, 46–47, 56

Saigon, evacuation of (1975) 47, 74
Sikorsky CH-54 Tarhe "Skycrane" helicopters 33, 37
Sikorsky H-19 Chickasaw helicopters 4
Sikorsky HRS-1 helicopters 4
Sikorsky R-4 helicopters 4
"Sky Cavalry" 4–5
"slick" assaults 41, 44, 50, 53–54, 56, **63**, 67
Starlight night vision scope 21
surface-to-air missiles 30

technical specifications 16–26
Tet Offensive (1968) 35, 44, 49
Thieu, President Nguyen Van 68, 69
training, air crew 39–44

US Forces
  in combat 52–72
  organisation 32–35, 41, 52
  strategy and tactics 31–38, 53–55
  US Air Force 37, 43, 46, 58
  US Army Green Berets 57
  US Marines 21, 45–46
  US Navy 38, 44

variants, UH-1 Huey 17–23

weapons, NVA/VC 14–15, 26–30, 36, 48–49
  anti-aircraft artillery 7, 15, **28**, 29–30, **56**
  machine guns 7, **9**, 14–15, **15**, **26**, 27–29, **30**, **35**, **36**, **48**
  mortars 7, 26–27
  radar early warning systems 14
  rifles 14, 15, **29**, 30, **49**
  rocket-propelled grenades 26–27
  surface-to-air missiles 30
Westmoreland, General William 35–36, 37, 56, 58, 61

XM3 48-shot launchers 14
XM16 quad machine gun system 14

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UH-1 cover art

A pair of 120th AHC UH-1Bs fire 2.75in. free-flight rockets from XM157 rocket pods at VC positions west of the South Vietnamese capital of Saigon in late 1964. The second UH-1B is firing its "quad" 7.62mm M60C machine guns, suppressing opposition in a landing zone so that an assault team of nine troop-carrying UH-1Ds can approach. UH-1s of the 120th AHC initially retained the high-visibility gloss paint scheme worn by the first UTTHCO helicopters in Vietnam, although overall drab green camouflage was eventually adopted. The mortarboard tail insignia was inherited from the helicopter's prior service with the 57th Transportation Company, which was one of the first UH-1 units to deploy to Vietnam in November 1961. (Artwork by Gareth Hector)

NVA/VC cover art

An NVA anti-aircraft battalion opens up at an approaching UH-1C gunship from a treeline beside the LZ. The helicopter's door gunner is in turn providing suppressing machine gun fire. The 12.7mm DShKM 1938/46 heavy machine gun (foreground) was the principal "helicopter slayer" weapon, seen as the communist equivalent to a US 0.50-cal. weapon. Fitted with anti-aircraft sights and a tall tripod mount, its ammunition included armor-piercing bullets that could penetrate crew armor protection and destroy helicopter engine and transmission systems or start fires in fuel tanks. To the left, another soldier fires a Kalashnikov AK-47, which became the standard assault rifle for communist forces in Southeast Asia due to its simplicity and reliability. (Artwork by Gareth Hector)

TITLE PAGE

A Huey pilot's most frequent adversary in Southeast Asia was a VC or NVA fighter emerging from an unseen "spider hole" and emptying his AK-47 into the UH-1 at close range, or firing from concealed positions in treelines around the LZ. (Dr. István Toperczer collection)